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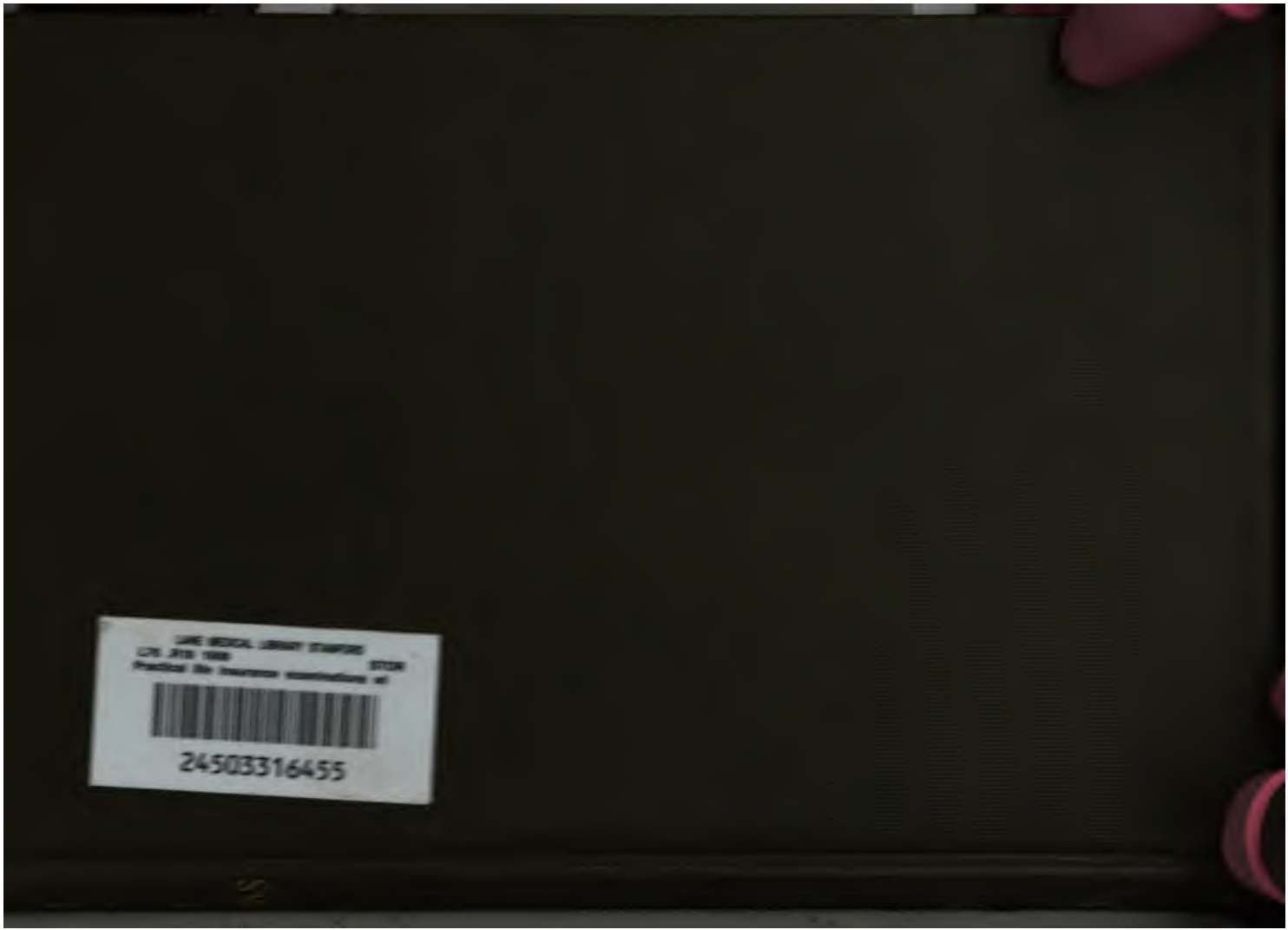
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PRACTICAL LIFE INSURANCE EXAMINATIONS

WITH

A CHAPTER ON THE INSURANCE OF SUBSTANDARD LIVES

BY

MURRAY ELLIOTT RAMSEY, M.D.

Philadelphia & London
J. B. LIPPINCOTT COMPANY
1908

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TO

WILLIAM J. RAMSEY,

THE KINDEST, MOST HELPFUL AND INDULGENT OF FATHERS,
THIS VOLUME IS MOST AFFECTIONATELY DEDICATED
BY THE AUTHOR.

11891

Preface

A medical examiner for a life insurance company occupies an important and responsible position in the medical field to-day.

This branch of medical science has developed into a specialty, and in order that the demands of the companies may be fulfilled, it is essential that the examiner should possess special knowledge and have qualifications rendering him capable of meeting these requirements.

After the devotion of many years to examinations for life insurance, the author has prepared this book on account of the realization of the necessity for such a work, with the single purpose of placing before the examiner his particular needs, and the practical application of such facts as may be revealed in his examination.

It is impossible, however, to write a work on this subject that would be entirely new, but an endeavor has been made to present the subjects in an attractive manner, and to make all deductions relevant to each subject.

Particular attention has been directed to the physical diagnosis and the prognosis of diseases of the chest and abdomen for these regions constitute the seat of the organs and structures which enter most vitally into the welfare of an insurance company.

In the preparation of this book, the experiences and opinions of others have been most helpful, all of whom

I have endeavored to credit in the text and to whom I acknowledge my grateful appreciation.

A chapter is devoted to Substandard Life Insurance. Most companies accept this kind of insurance and practice it in some of its forms. Although it is in its infancy, it offers a wide field for careful investigation and study.

I desire especially to express my sincere thanks to Dr. Henry Snyder for valuable literary services rendered.

MURRAY ELLIOTT RAMSEY.

JERSEY CITY, N. J., January, 1908.

CONTENTS

CHAPTER I. PAGE

GENERAL INTRODUCTION.—PERSONAL QUALIFICATIONS OF THE EXAMINER..... 13

The Medical Examiner. Necessary Qualifications. Duties. Forwarding Reports.

CHAPTER II.

EXTERNAL EXAMINATION OF THE APPLICANT 17

Identification. Privacy. Age. Expectation of Life. Occupation. Climate. Race. Sex. Married or Single.

CHAPTER III.

EXTERNAL EXAMINATION OF THE APPLICANT. (*Continued.*) 26

Physical Appearance. Personal Appearance. The Hair. The Skin. The Nails. The Eyes. The Pupil. The Eye-ball. The Ear. The Nose. The Mouth. The Tongue. The Neck. Station. Gait. Stigmata of Degeneracy. Physical Defects and Deformities.

CHAPTER IV.

PERSONAL HISTORY OF THE APPLICANT WITH REFERENCE TO DISEASES AND CONDITIONS, ACQUIRED OR HEREDITARY..... 38

Habits. Diathesis. Cachexia. Family History. Heredity. Medical History. Subjective Symptoms.

CHAPTER V.

PHYSICAL EXAMINATION OF THE CHEST..... 57

Introduction. Topographical Anatomy of the Chest. (Regional Anatomy). Inspection. The Normal Chest. The Flat Chest. The Barrel-shaped Chest. The Altar

CONTENTS

PHYSICAL EXAMINATION OF THE CHEST (*Continued*)..... 57

Chest. The Pigeon Breast and Rachitic Chest. The Funnel Breast. Unilateral Enlargement. Unilateral Contraction. Local Enlargement, Contraction, or Depression.

CHAPTER VI.

PHYSICAL EXAMINATION OF THE CHEST. (*Continued.*)

THE LUNGS..... 64

Inspection. Types. Rate. Rhythm. Diaphragm Phenomenon of Litten. Mensuration. Normal Expansion. Deficient Expansion. Extreme Expansion. Palpation. Vocal Fremitus. Percussion. Technic of Percussion. Analysis of Sounds. Types of Normal Percussion Sounds. Variations of Normal Percussion Sounds in Health. Percussion in Disease of the Lungs. Hyperresonance. Skodaic Resonance. Tympany. Diminished or Impaired Resonance. Dulness or Flatness. Modifications of the Normal Resonance with Added Qualities or Alterations. Cracked-pot Sound. Amphoric Resonance. Wintrich's Phenomenon. Interrupted Wintrich's Phenomenon. Gerhardt's Sign. Friedrich's Phenomenon. Biermer's Sign. Coin Percussion. Auscultation. Technic. Methods. Respiratory Sounds. The Normal Breath Sounds. Bronchial or Tubular Breathing. Vesicular Breathing. Modifications of Normal Breath Sounds. Breath Sounds in Disease of the Lungs. Bronchial Breathing Replacing Vesicular Murmur. Cavernous Breathing. Amphoric Breathing. Broncho-vesicular Breathing. Changes of Rhythm. Prolonged Expiration. Jerking or Interrupted Inspiration. Alterations of Intensity. Puerile Breathing. Diminished or Absent Vesicular Breathing. Auscultation of the Voice. Vocal Resonance. Increased Vocal Resonance. Diminished Vocal Resonance. Bronchophony. Pectoriloquy. Egophony. New or Adventitious Sounds. Dry Rales or Rhonchi. Moist Rales. Crepitant. Sub-crepitant. Large Moist. Metallic Tinkling. Succussion Sound. Friction Sound.

CONTENTS

CHAPTER VII.

PHYSICAL EXAMINATION OF THE CHEST. (*Continued.*)
THE HEART 94
Introduction. Topographical Anatomy of the Heart. The Percussion Areas. The Auscultation Areas. The Cardiac Cycle. Inspection. The Apex Beat. Displacements of the Apex Beat. Extent and Character of the Cardiac Impulse. New Pulsations. Pulsations Not Restricted to the Præcordia. Arteries of the Neck. Pulsations in the Episternal Notch. Epigastric Pulsations. Pulsations of the Liver. Inspection of the Smaller Arteries. Inspection of the Veins. Palpation. Thrills. Friction Fremitus. Percussion. Auscultation. The Normal Heart Sounds. Alterations of the Normal Sounds. Alterations of the Individual Sounds. Accentuation of the First Sound. Accentuation of the Second Sound. Accentuation of the Aortic Second Sound. Accentuation of the Pulmonary Second Sound. Reduplication of the Heart Sounds. Adventitious Sounds. Organic Murmurs. Individual Murmurs. The Frequency with which Valves are Affected. Hemic Murmurs. Exocardial Murmurs. Pericardial Friction. Pleuro-pericardial Friction. False Murmurs.

CHAPTER VIII.

THE PULSE. BLOOD-VESSELS, AND NEUROSES OF THE HEART 128
Rate. Size and Condition of the Vessels and their Walls. Rhythm. Tension. Pulse Wave. Palpitation. Tachycardia. Arrhythmia. Bradycardia. Embryocardia.

CHAPTER IX.

PHYSICAL EXAMINATION OF THE ABDOMEN 134
Introduction. Technic. Abdominal Areas. Inspection. Movements. Palpation and Percussion. Abdominal Organs.—The Stomach. The Liver. The Spleen. The Gall-bladder. The Intestines.

CONTENTS

CHAPTER X.

EXAMINATION OF THE URINE 145
Introduction. Quantity. Color. Density. Reaction. Chemical Examination. Albumin. Sugar. Pus. Alkapton.

CHAPTER XI.

DISEASES AND CONDITIONS AFFECTING LIFE INSURANCE .. 155
Abscess. Alcoholism. Aneurism. Appendicitis. Asthma. Colic and Cramps. Constipation. Cough. Diarrhœa, Chronic. Digestive System. Drug Habits. Dyspnœa. Ear, Discharge from. Emaciation. Epilepsy. Eruptions. Fainting. Fistula. Glands, Enlarged (See Neck). Gout. Hæmophilia. Hæmoptysis. Headache. Hemorrhoids. Hernia. Injuries and Surgical Operations. Jaundice. Muscular Development. Obesity. Œdema. Paralysis Agitans. Pensions. Physician, Family. Prostate. Rectum. Reflexes. Rejection, Previous. Residence, Change of. Rheumatism. Sanitary Surroundings. Sclerosis-arterio. Stricture. Syphilis. Temperature. Tobacco. Tremor. Tuberculosis. Tumors. Ulcers. Urination, Difficult or Frequent. Vaccination. Varicose Veins. Vertigo. Weight. Women, Examination of. Addenda.—The Nervous System. Intellection. Mental Health. The Examiner's Recommendation.

CHAPTER XII.

THE INSURANCE OF SUB-STANDARD LIVES 191
Introduction. Sources of Limitations and General Classification. Family History. Personal History. Occupation, Moral Hazard, and Environment. Under-weight and Over-weight. Heart Lesions. Albuminuria. Asthma. Glycosuria. Syphilis. Tuberculosis. Substandard Policies.

BIBLIOGRAPHY 219

INDEX 221

Practical Life Insurance Examinations

CHAPTER I

GENERAL INTRODUCTION

PERSONAL QUALIFICATIONS OF THE EXAMINER

The Medical Examiner.— In accepting a commission as a Medical Examiner for a life insurance company, the physician should feel highly honored and a deep sense of his responsibility and duty to the company should be uppermost in his mind.

Primarily the success of an insurance company depends to a larger extent on its medical examiners than on any other one class of its employees. They are practically the guardians of its treasury and the protectors of its policy holders. Realizing thus the dignity and importance of their position and the confidence reposed in them, they should be alert and active to the situation and assume the burden of the trust bestowed on them with the same candor and spirit the medical director exhibits in its bestowal.

Necessary Qualifications.—The qualifications necessary to become a successful examiner are many. He must have an unyielding fidelity to his company as his first requisite, the binding power of his moral duty and the moral courage to resist and withstand influences

that may seek to sway him from the path of rectitude; he must be a man of culture and refinement, possess an irreproachable character, be a skillful tactician, firm in his decisions and capable of weighing all facts uncovered in his examination and of presenting them in a lucid and concise manner to the medical officers.

An examiner's path is not "strewn with roses." Many problems will be presented to him which are difficult of solution; therefore he must be resourceful and courteous, resolute and sturdy in his determinations and have the ability to cope with and solve all perplexing questions and deduce conclusions consistent with the facts.

His knowledge of diagnosis and prognosis should be of the character and technic required to elicit the smallest point that may have a bearing on the acceptability of the risk.

The medical selections depend chiefly on the efficiency of the medical examiner; hence medical examiners should be careful, conscientious men, remembering always that the ultimate result of their work will have a far-reaching effect both on the company and the policyholder.

Duties of an Examiner.— The liberal education and training that the majority of examiners possess should make them charitable for the feelings, wishes and rights of those with whom they come in contact in the performance of their duty.

The medical examiner must have in mind, first, the welfare and best interests of the company, he must be the exponent of loyalty and fidelity to it, he must conserve and protect it at every point; yet, at the same

time, he must remember the great amount of energy necessarily displayed in many cases by the agent in order to secure the application, and to him the examiner should extend all courtesies and respond with promptness, although at times it may be an inconvenience to himself. " Strike while the iron is hot " is an aphorism that is singularly applicable in life insurance work.

The agent is the primal factor in the great work, and it is by reason of his incessant and untiring labor in the field, his vigorous prosecution of his vocation, that results are accomplished.

Not all applicants presented for examination are good risks, and in many cases they are not over enthusiastic, but have consented and signed the application because of pressure. It is in these cases that an examiner must use diplomacy, he must be courteous to the agent and use tact towards the applicant. In this way he can be of assistance, without in any manner lowering the dignity of his position.

A faithful and attentive agent, particularly one who has seen long service, will not, as a rule, try to influence an examiner, for he sells the contracts on their merits and expects the civilities extended to the examiner to be reciprocal.

FORWARDING REPORTS.—Some companies require their examiners to forward direct to the home office the application together with all facts appertaining thereto, after completion; others require the applications to be submitted to their general agents, so that they may take up with the examiners the matter of omissions due to clerical errors, etc., thus avoiding the annoyance and delay incident to correspondence.

The former plan seems to be preferable, inasmuch as it relieves the examiner of the embarrassment necessarily following the review of his work by others than the medical officers of the company, and also serves to maintain the secrecy and confidence which should always exist between the medical department and its examiners in the field.

It is a matter of absolute justice to all concerned that the examiners should be encouraged to give freely and exhaustively of their knowledge and discuss thoroughly their opinions in respect to a case, and at the same time have the serenity of mind in knowing that these expressions of their views will be kept inviolate within the precincts of the home office.

CHAPTER II

EXTERNAL EXAMINATION OF THE APPLICANT

Identification.—In view of the fact that cases of substitution often occur, and attempts to defraud life insurance companies are common, the examiner's first care must be to assure himself absolutely of the identity of the applicant.

A suitable introduction by the agent or a mutual acquaintance is the most satisfactory, but this is not feasible at all times, and the physician must use other means and rely on himself for the necessary evidence.

The examiner can take the applicant's signature preliminary to the examination and compare it with the signature secured by the agent on the face of the application; he can question the applicant on that part of the application completed by the agent and the answers should correspond as to the time and place of birth, name and residence of the beneficiary and other insurance carried, if any; the examiner may obtain an accurate description of the person to be examined from the agent so that he can not possibly make an error in examining any other than the proper person. Other resources are open to him and will suggest themselves if he is an attentive and vigilant examiner.

If after having exhausted his means of identification there still remains a doubt in his mind as to the identity of the person examined, he must acquaint

the home office of the fact immediately, and with the resources at their command the company will establish positively whether the applicant is an impostor.

On the examiner's part tact, courtesy, and skillful and refined management are required in the handling of these delicate matters.

After death it sometimes becomes necessary to identify the dead. This requires carefulness in noting and describing accurately, as to location and size, any mole, scar, nævus, or other marks or deformity that may exist, and which may be of assistance, and may, as often occurs, be of the greatest importance.

The identity of an applicant, therefore, is one of the most important features to a life insurance company. While in recent years impostors are not so frequent as formerly, yet in justice to the examiner and in the discharge of one of his duties to his company, he should exercise the greatest care, for no reputable physician desires to aid, in any manner, conspirators in their nefarious and abominable transactions.

Privacy.— All examinations should be conducted in private, and the examiner must insist that a third person be not present, and that the place where the examination takes place be free from noise. These are necessities, and privacy and retirement are the best armaments a physician possesses for gaining the full confidence of the applicant and for obtaining all information in reference to his family and personal history, and all other matters that will vitally affect

's ultimate survey of the completed form,
e final decision in regard to the recom-
may be made.

Age.— The age and the apparent age are questions always asked and must be determined with as much accuracy as possible. The reasons for this are readily perceived when it is remembered that it is the basis upon which the premiums are paid and upon which the decision is based as to whether or not the applicants are within the age limits in which they are accepted.

It is manifestly unjust to the other policyholders for a man to mis-state his age and be accepted at that age, and participate in the benefits accruing from a class to which he does not belong. A few years' difference would, of course, be difficult to detect, but any great discrepancy could be easily determined; it is a fact, however, that candidates for life insurance are more apt to understate their age than they are to overstate it.

If an applicant appears older than the age stated, it makes us apprehensive of some serious condition; it may be due to overwork or strain, dissipation, some external agency, business worry, a deep seated disease or the culmination of a process beginning in youth and finding expression in middle life.

The family history and the environments of his progenitors have much to do with apparent age, if a man's parents have tubercular disease in any of its forms or have through poverty or unfortunate business associations been compelled to undergo hardships, it necessarily has its effects on the offspring. The same effects are seen in those born of neurotic parents; their resistance is lessened to diseases of childhood, of which the marks are left; their vitality is lowered, the results being the expenditure of more energy in coping with

business propositions and inability to endure prolonged physical exertion, thus causing them to become prematurely old.

If the aging is rapid you should exercise the utmost care in securing all facts and make a thorough examination of the lungs, vessels and kidneys, and acquaint yourself with the occupation and habits of the applicant, and make a full report of your findings.

The rule for determining expectancy, by the Actuaries' or Combined Experience Table, is as follows:

Take two-thirds of the difference between the given age and 80 years. This will be the required amount except for ages from 20 to 40; for these add one to the result.

Expectation of Life.—On the next page is given the Table of Mortality in use by the New York State Insurance Department.

Occupation.—The question of occupation is one of great importance to the medical director and enters largely in determining his decisions in each case.

The reasons for this are obvious. The revolution and increase in manufacturing and other lines of industry have been produced by the progress and development of inventions and by new activities in commercial and business life. New channels of employment carrying with them increase in hazard have thus been opened.

All occupations depending for their success on the quick perception of the relation of things apparently unrelated, causing a constant tension, and other vocations in which the moral aspect of life is lost, accompanied by late hours and excesses, which naturally fol-

low and are inculcated into such a life, involve circumstances connected with the personal history and the

TABLE OF MORTALITY.

Expectancy			Expectancy			Expectancy		
Years	Years	Days	Years	Years	Days	Years	Years	Days
18	42	322	46	22	355	74	6	314
19	42	70	47	22	99	75	6	176
20	41	179	48	21	205	76	6	41
21	40	289	49	20	318	77	5	278
22	40	33	50	20	66	78	5	154
23	39	143	51	19	183	79	5	33
24	38	249	52	18	300	80	4	285
25	37	358	53	18	59	81	4	176
26	37	99	54	17	183	82	4	66
27	36	205	55	16	314	83	3	329
28	35	314	56	16	81	84	3	230
29	35	55	57	15	216	85	3	132
30	34	157	58	14	355	86	3	37
31	33	263	59	14	136	87	2	307
32	33	4	60	13	282	88	2	216
33	32	110	61	13	66	89	2	128
34	31	212	62	12	223	90	2	41
35	30	318	63	12	19	91	1	325
36	30	55	64	11	187	92	1	245
37	29	161	65	10	355	93	1	172
38	28	263	66	10	168	94	1	103
39	28	...	67	9	351	95	1	44
40	27	103	68	9	172	96	.	362
41	26	205	69	9	...	97	.	325
42	25	307	70	8	198	98	.	274
43	25	44	71	8	37	99	.	184
44	24	146	72	7	245			
45	23	252	73	7	95			

observance of hygienic laws, which constitute the moral hazard. These lower the resistance and impair the life.

The examiner should interrogate the applicant very carefully and satisfy himself that the occupation given is correct, and state specifically the applicant's particu-

lar relation to the business or employment in which he is engaged, this being still more important and desirable if the occupation is hazardous.

The influence of occupation on longevity has been carefully computed, as applying to general principles, but the examiner must judge in individual cases from what has been elicited by the examination whether the applicant's vocation is compatible with a long life, *i.e.*, whether his physical powers and ancestral history are sufficiently good to neutralize any prejudicial influence occupation may have on his life.

He should particularly inquire of the applicant as to his previous occupation, for many conditions of health enforce a change, and it is an easy matter for a man to return to his former calling, which may not be as acceptable as the one he is now following; again, the deleterious influences of a former occupation sometimes leaves its impress on an individual even in after years.

The active occupations because of the exposure connected therewith may predispose to rheumatism or pneumonia, while in the sedentary class we expect to find digestive disturbances, constipation, anæmia, hemorrhoids, obesity, and neuroses.

In the special class we find players of wind instruments more subject to emphysema; varicose veins are found in shop clerks, motormen, policemen, and those who are required to assume the standing or semi-erect posture for long periods of time; lead and other poisoning in painters, gilders, and those engaged in the manufacture of articles used in these and allied trades, which compel them to come in contact with these

poisons; bronchitis and phthisis in grinders and polishers of metals, marble cutters and printers. Those vocations requiring exposure to the inhalation of irritating vapors, toxic substances and all kinds of effluvia predispose to laryngeal troubles and may invite tubercular infection.

There is another class in which the liability to accident is especially great, the increase in the risk being so formidable that but few, if any, companies will entertain an application on their lives without an extra premium or the placing of them in a special class.

In the cases of boatmen, analytic chemists, bridge builders, electric light inspectors, planing mill employees, etc., the risk is great.

In all cases where the risk is extra hazardous, the medical officers are the sole judges.

The subject covering occupation in all of its phases is vast and intricate; therefore too much care cannot be exercised in presenting to the medical director the true state of affairs, as they exist in each individual case, and from the abundance of material at his disposal he is best able to judge of the effects on longevity and association with disease.

Climate.— The geographical association of diseases is well known. Certain districts are noted for their affinities for and connection with particular diseases.

Sudden or excessive meteorological changes derange the functions of the organs and predispose to certain affections.

These districts are known for the prevalence of malaria, epidemic diseases, goitre, vesical calculi, diarrhœal affections, and again certain health resorts,

where consumptives seek recuperation in large numbers, are deleterious because the dangers of infection from this disease are multiplied.

Acclimation is the peculiar change the system gradually undergoes, which habituates it to its new surroundings and renders it capable of withstanding the pernicious influences of certain localities.

The contemplation of a change of climate, for any reason aside from health, should be known; because the prevention and prophylaxis against climatic diseases rests to a large extent on the resisting powers of that individual, as determined, not only by his superior physical condition, but also on the ancestral history and the tendency of the family to long lives.

The element of risk is further minimized by a strict observance of hygenic laws, and by the gradual adaptation of individuals to their new environments and by an intelligent study of the manner of dress and diet of the natives.

Race.— The immunity of certain races from or their susceptibility to particular diseases is well known and an inquiry as to nativity is important.

The Scandinavian and African races are very susceptible to consumption, and the latter also to syphilis.

The Jewish race is susceptible to diabetes.

Alcoholism and diseases resulting from over-indulgence in alcoholic liquors are found, chiefly, among those of foreign birth.

Apoplexy is found among the Scotch as are also kidney diseases.

Suicides are found most frequently among the Germans or those of German extraction.

Sex.— The most important distinction in reference to the diseases of the sexes, in undue proportion, is the result of the anatomical and physiological difference in their structure and office, and the agencies operating in their exposure to the different elements in their lives.

Occupation, exposure to the inclemencies of the weather, pressure of business and the formation of pernicious habits are all causal factors in those diseases to which the male sex are particularly liable.

The more or less sedentary habits of those of the female sex predispose them to the neuroses.

Women are more subject to cancer, tuberculosis and rheumatism, and men to the degenerative processes.

Married or Single.— Married people, as a rule, are better risks and more desirable than single, for the reasons that their habits are more established, their routine varies less, and the marital relations, if properly fulfilled, are more conducive to longevity.

Green makes an exception in the cases of men who marry late in life, where a great disparity exists between the ages of the bride and groom. In these cases marriage does not improve the risk.

In women, during the child-bearing period, the mortality is greater than after the menopause is reached. In the Jewish race this is particularly noticeable, because of the large number of children born to them and the increased dangers of parturition and the complications following it.

In the cases of women who have born children, inquiry must be made as to whether any difficulty or sequela attended the labor.

In primipara a postponement should be recommended until after the travail.

CHAPTER III

EXTERNAL EXAMINATION OF THE APPLICANT (Continued)

Physical Appearance.—The general appearance of the applicant, especially to those, who have had a large experience, and are close observers, will give a comprehensive conception of the man almost intuitively; it may be difficult for them to express their impressions, but, the fact remains, nevertheless, that the conclusions reached, in many instances, are correctly deduced, from the mental impression received in reference to his physique, facial expression, manner, gait, and external appearance.

The configuration of the body should be considered, for in many instances a predisposition can be determined with some degree of uniformity, with allied types. A person possessing a tall, thin body, with the bony system correspondingly developed, is more likely to be the victim of tubercular disease.

A person with a short, thick formation of the body is prone to apoplexy and obesity.

A good physique, with muscular development well marked, complexion clear, circulation active, lung power competent, and kidneys normal, indicates that the possessor is endowed with great endurance. His assimilative and nutritional powers are sufficient to withstand the invasion of ordinary diseases, and should incline the examiner to be favorably disposed towards him.

The facial expression is an index of the condition of health enjoyed; it reflects all degrees of indisposition from those, which are slight and due to temporary causes to those having the most profound effect on the system; it is, therefore, a valuable diagnostic sign in many conditions and diseases. It, also, gives us a fairly good insight into the individual's habits and character, and the condition of his mental health.

Personal Appearance.—Disregard or indifference in the manner of dress justly demanded by his own modesty or social propriety may indicate alcoholism or enfeeblement of mind.

The odor of urine suggests incontinence or cystitis; dried whitish spots on the clothing or shoes may denote a diabetic condition; very tight clothing suggests dropsy or an abnormally rapid increase of fat; loose or unfastened shoes may be the result of an œdema or rheumatism.

An inherent modesty in some will cause them to fail to meet the examiner's eye squarely. This inability may, however, sometimes mean a mental weakness or a desire to deceive.

The Hair.— Alopecia is a mark of health deterioration.

The whitening of the hair, whether premature or localized, is probably due to neuritis, and may be regarded as a premonitory symptom of a serious degenerative disease.

In the literature of this subject there is supporting evidence that this symptom is connected with locomotor ataxia.

The Skin.— The condition of the skin, with reference

to nutrition and color, indicates fairly the condition of the system at large. It enables us to judge of the activity of the circulation and any impairment of the vital forces has its reflection in the skin.

Aside from occupation and the physiological changes due to age, the skin exhibits changes in some individuals to a darker or muddy color as a result of digestive disturbances and constipation or uterine disease.

The high color due to excesses in alcoholic stimulants is known to all.

The ruddy appearance sometimes seen in those of full habit, instead of being the sign of robust health, is, in fact, due to endarterial changes, and is caused either by hepatic cirrhosis, or, if associated with increased tension and accentuation of the aortic second sound, it is highly probable that the condition is caused by cirrhosis of the kidney.

In tuberculosis the flush is seen on the cheek during excitement and exertion; a fleeting flush is seen in anæmia.

Pallor is seen in individuals who are restricted within doors; it is observed in anæmia, syphilis, lead poisoning and Bright's disease; a bronzing of the skin is seen in some cases of diabetes, diseases of the pancreas and Addison's disease.

The diagnostic value of these changes is significant only when associated with other symptoms distinctive of these diseases.

Any cicatrices or scars should be carefully noted, not only for possible identification, but also for our enlightenment with reference to any previously existing disease.

Linear striæ may have been the result of dropsy, obesity or a tumor; scars in the region of the cervical or inguinal glands may have been caused by a venereal or tuberculous process; scars the result of epilepsy should be remembered.

The Nails.—The nutrition of the nails is affected in many chronic diseases, as phthisis, aneurism and cardiac affections, causing a transverse curving and sometimes a clubbing of the fingers. Transverse grooves are often seen after severe illnesses, and the time elapsed since convalescence began may be approximated by remembering that it takes about six months for the nail to grow from matrix to end.

The activity of the circulation and the condition can be determined by pressure on the tip and noting the rapidity of its return and the degree of exsanguination of the nail bed.

The Eyes.—The eye being so intimately connected with the circulatory and nervous systems, naturally reflects any changes occurring in them, and because of the ease and accessibility of examination a close study of the altered conditions of the eye should be made particularly when those diseases causing such changes are known or surmised.

The development of cataract in diabetes is frequent.

The urine should always be examined when this or other alterations of vision are found.

Conjunctivitis is often associated with rheumatism and may occur between the attacks.

Retinitis or neuro-retinitis is caused chiefly by chronic interstitial nephritis. The ocular manifestations occur more frequently from this than any other

systemic affection, and two years is the average life after it first appears.

It occurs also in atheromatous degeneration of the arteries, hypertrophy, valvular diseases of the heart, and syphilis.

Papillitis or choked disk, is a descending optic neuritis, and in addition to its accompanying retinitis in the systemic diseases, it is present in and an early sign of intracranial tumors or growths, irrespective of their size.

A swollen condition of the lower eyelids is one of the earliest signs of renal disease and one of the prominent symptoms noted during the administration of arsenic and iodine.

Warts on the eyelids of older men may be the beginning of an epithelioma.

Ptosis may be due to paralysis of the third nerve, pressure of a tumor (usually gumma) and is also seen in locomotor ataxia and sometimes as a result of diphtheria.

THE PUPIL.—The observation of the pupil with reference to paralysis and the unequal dilatation or contraction or other inequalities must be carefully noted and the exciting or latent cause established.

The condition known as the Argyll-Robertson pupil, in which the reaction to light on the part of the pupil is absent or sluggish but the response to accommodation persists, is seen most frequently in locomotor ataxia.

THE EYEBALL.—The protrusion of the eyeball if bilateral is usually caused by exophthalmic goitre, but may be the result of an asthmatic condition or cardiac

disease; unilateral protrusion may be caused by aneurism, lachrymal enlargement, or tumors of the orbit.

The Ear.— The external ear sometimes exhibits more clearly the hue peculiar to chlorosis and anæmia than other parts of the body.

Tophi are deposited and found in the helix in an individual of gouty diathesis.

Any discharge from the ear demands an investigation, for many cases of purulent meningitis result from suppurative otitis.

The Nose.— The deformities of the nose are of diagnostic significance when extensive; in myxœdema the nose becomes thickened, and in destructive syphilitic lesions the bridge is depressed, giving us the "saddle nose"; this must be differentiated from depression caused by fracture.

The presence of nasal polypi should be determined and their history, if removed, given in detail.

Ulcers may be of tubercular or syphilitic origin, and, if present, any ulceration calls for a rigid examination.

The Mouth.—The lips are pale in anæmia or enfeebled circulation from any cause.

Epithelioma, chancre or mucous patches are often situated on the lips.

An epithelioma may be recognized by, at times, originating from a wart, usually on the lower lip of men of middle age, the ulcer having an irregular shape with a tendency to scabbing.

A chancre is known by being single with an indurated base and glandular enlargement.

Mucous patches are usually found in the angles of the mouth, are flattened growths and covered with a whitish deposit.

The Tongue.—The tongue is studied for evidences of tuberculosis, syphilis and the presence or absence of scars; if scars are found they may be the result of epilepsy; healed ulcers, if not due to traumatism, are usually of a syphilitic nature. If ulcers are found at the time of your examination, a differential diagnosis must be made; a chancre is recognized by the sharp line of demarcation, induration of the base, its location near the lips and glandular enlargement; traumatic ulcers are usually situated opposite a sharp tooth and are not associated with enlargement of the glands; tubercular ulcers are associated with tubercular disease in other organs.

An epithelioma may be known by eliminating the other diseases, by the age of the applicant, and by its resistance to improvement under treatment.

The Neck.—The neck should be examined with reference to its rigidity, motility and enlargement from any cause.

A rigid neck is due sometimes to disease of the cervical vertebræ, rheumatism or traumatism of the muscles, cicatricial contraction from burns or carbuncles (the latter often of diabetic origin).

A tumor partaking of the tracheal movements is an enlarged thyroid and demands a minute description; the examiner must differentiate between a simple hypertrophy without pulsation, fluctuation or thrill, and an adenoma, aneurism, gumma, and tuberculosis.

Aneurism and tumors in the root of the neck will cause an enlargement of the thyroid because of the interference with the circulation.

The enlargement of the cervical glands should be

described in detail; if the deep cervical glands are involved, their consistency must be known, whether single or multiple, acute or chronic, the latter being caused by tubercular infection when they have a tendency to suppuration, and syphilitic when non-suppurating; if the post-cervical glands are enlarged and associated with enlargement of the epitrochlear glands, it is of great diagnostic significance, because the majority of cases are due to syphilis.

If the enlargement of the cervical glands is associated with the enlargement of the lymph glands in other parts of the body, Hodgkin's disease is probable.

The cervical glands may be involved as a result of malignant growths in other parts of the body, particularly gastric cancer.

One further word—in connection with the neck the tracheal tugging in supposed thoracic aneurism should be noted. (Proposed by Ewart and described by Musser, Medical Diagnosis, page 971.)

Station.—Individuals posessing a healthy and vigorous mind and body will naturally assume and have a military appearance, standing firmly on their feet, with body and head carried erect, shoulders level, and on the whole giving the impression of stability.

The power to stand and walk is diminished or disturbed in many diseases, particularly those of the nervous system; therefore the applicant's inability to perform these functions is of serious import and demands close observation on the part of the examiner and correct interpretation of these signs.

Normally a healthy person standing with his feet together, toes and heels approximating each other as

closely as possible, will sway not more than one inch either forward or backward or from side to side.

In some nervous troubles, notably locomotor ataxia, the swaying is greatly exaggerated, and the individual is unable to walk with the eyes closed or in the dark.

Swaying is also one of the prominent symptoms in disease of the middle lobe of the cerebellum.

Gait.—The mode and manner of walking are most important in arriving at a correct conclusion in regard to any defects or deformities and diseases particularly of the nervous system.

The gaits of the latter are in many instances pathognomonic of the diseases with which they are associated, and a clear knowledge of these characteristic signs is of inestimable value to the examiner and should be read with unerring precision.

In recent or old injuries, rheumatism, sciatica, neuralgia, hip and knee diseases, the limping is characteristic.

In nervous diseases the gait is even more confirmatory.

A brief description of the different gaits is as follows:

ATAXIC GAIT.—The foot is suddenly raised too high, thrown quickly forward and brought down to the floor heel first or flat-footed with a stamp. In walking the feet are far apart and the eyes are kept on the floor to enable the individual to see where to place his feet, thus supplementing his loss of sensation.

SPASTIC GAIT.—In this gait the legs are more or less stiff, the feet are not raised wholly from the floor, consequently the foot is dragged along in a semi-circle,

the toes scraping the floor. This is seen in hemiplegia unilaterally and in lateral sclerosis bilaterally.

STEPPAGE GAIT.—In this gait the foot is raised high, the toes dropping, and is brought to the floor heel first. This particular movement is caused by paralysis of the extensor muscles of the foot and is seen chiefly in multiple neuritis.

FESTINANT GAIT.—The body and head of the applicant are bent forward, assuming a stooping posture, the steps are short and quick, seemingly trying to increase his speed. This is seen in paralysis agitans.

These gaits are the ones an examiner is most likely to encounter and are therefore of most interest to him.

Stigmata of Degeneracy.—A departure from the normal type and alterations in the structure of the body are suggestive of hereditary influences and are often associated with mental disturbances. These anomalies, unless they are marked, are not in themselves of vital importance, but the fact of their existence should lead us to believe that the ancestral history is, perhaps, defective, or there is an hereditary diathesis that should be determined.

The physical characteristics of degeneracy are seen in cranial deformities, asymmetry of the face, palatal deformities, ears too large, their position with reference to the head abnormal, or there may be some vestige of animal type, arms long in proportion to the body, resembling the simian type, or the legs out of proportion to the torso, dwarfism, giantism, high degrees of astigmatism and nystagmus, femininity and masculinity.

The physiological stigmata embrace the defects in speech and abnormal conditions of the special senses.

The psychic stigmata vary from those with unusual mental capacity to imbecility, with the shades between these extremes.

The practical application of our knowledge with reference to the various stigmata is—if any one is prominent or several are associated in the same person, we should endeavor to find evidences of epilepsy, insanity, or other nervous troubles.

Physical Defects and Deformities.—It can be accepted as a fundamental rule that all deformities and malformations, whether congenital or acquired, will be sufficient cause for rejection when they are extreme, when locomotion is seriously impaired or because of the repulsive appearance of the individual.

The deformities of occupation and their influences on health and longevity must be determined in each individual case, all particulars and associated conditions must be presented and accompany the examiner's report.

The most common defects to be noted are *curvature of the spine, blindness, deafness,* and *amputations.*

CURVATURE OF THE SPINE.—A slight lateral curvature is present in most persons and is not significant, but a marked deformity, particularly kyphosis, denotes a defective, and, in the majority of cases, a tubercular family history; the vital organs are cramped and cannot perform their functions as well as if they were normally situated. Their resisting powers are weakened and a predisposition to diseases of the chest and

Any marked deformity of the spine of whatever nature is not a desirable risk.

BLINDNESS.—Blindness constitutes a defect which may affect the desirability of the risk and may be regarded as an unfavorable feature according to its cause; if it is the result of an injury, affecting one eye only, the repair having been perfect, no objection could be found; but if the blindness is progressive, affecting both eyes, and caused by some constitutional trouble, such as nephritis, diabetes, or syphilis, the prognosis is affected accordingly.

A person totally or partially blind from any cause is rendered more liable to accident than one in possession of his sight.

DEAFNESS.—Deafness operates in much the same manner in regard to impairment. It, however, varies according to the degree, which must be stated in addition to the cause.

AMPUTATIONS.—It must be stated clearly just where the amputation was made and the cause requiring such procedure with the condition of the stump. In case the lower extremity is involved state if an artificial leg is worn.

CHAPTER IV

PERSONAL HISTORY OF APPLICANT WITH REFERENCE TO DISEASES AND CONDITIONS, ACQUIRED AND HEREDITARY

Habits.—An intimate knowledge of the personal habits of an applicant is always very desirable, but in large cities this is almost an impossibility, and in the majority of cases an examiner must rely more on the statements elicited during an examination and his own ability to apply this knowledge to further elucidation in any direction, and to detect any excesses that may exist.

We must consider him from every standpoint—age, physique, ancestral history, occupation and environment, past illnesses, the kind and amount of alcoholic beverages taken, and the amount of tea, coffee, tobacco, or narcotics used. The habits of dress, hours devoted to sleep, rest and recreation, regularity of eating, financial exigencies, conditions of the marital relations, all have a bearing on the risk, inasmuch as a curtailing, disregarding or immoderate indulgence in them will have its predisposing influence in the causation of diseases originating from this remissness and negligence on the part of the applicant.

Having acquired a competency, the moral hazard assumes another phase, because of the radical change in the applicant's manner and mode of living. Dr. Denslow Lewis sums up his conclusions as follows:

"From a hard working business man, the middle aged applicant of wealth becomes perhaps a gentleman of leisure, with all that the term may imply. His manner of life changes completely; his associates are newly made acquaintances with tastes and habits not conducive to the preservation of health.

"The ennui of leisure and the boredom of inactivity lead too often to indulgence in what are called the pleasures of life, and danger of nervous instability, alcoholic excess, and venereal infection is more than problematical, or placed at the head of some great enterprise, spurred on to continued activity by a new and ever increasing ambition, the middle-aged man works beyond his strength and keeps up his zeal by a resort to alcohol, nicotine, and perhaps opium as well.

"Moreover his pleasures are far from simple; the poker game, the gambling table, the stock market and the race track, together with over indulgence in stimulants and narcotics, too often sap a vitality which is already reduced by excessive and harmful application to business." *

Diathesis.—Diathesis may be stated to be "born with one." It is a peculiar predisposing influence toward certain diseases. It may be either congenital or acquired, and must depend for its significance on its innate existence.

The congenital diathesis may depend on the physiological imperfections of the progenitors at the time of conception and the loss of power to transmit vigor and vitality to their offspring on account of the disparity

* Med. Ex. and Pract. Aug. '05.

in age or of advanced age, or impairment of the constitution from dissipation or systemic diseases.

The acquired diathesis arises usually from past occurrences of the infectious diseases and the environment of the individual, particularly as to sanitary surroundings.

It is impossible to state exactly to which diathesis a particular individual belongs, but after obtaining his pathological history it will enable us to classify him, and will materially assist us in our final conclusions and in prognosticating his possible future impairment with reference to certain diseases.

We recognize the *lithæmic, gouty, scrofulous* or *tuberculous,* and *nervous* diathesis.

Lithæmia and gout are apparently associated in the minds of many as having a common cause. Thompson believes that although the pathogenesis seems closely related, there is abundant proof that they are not identical, and a sufficient distinction exists to warrant them being considered as separate conditions; a well marked lithæmia may be present without the hereditary history of gout, the joint complications, or the presence of tophi.

The *lithæmic* diathesis confines itself chiefly to persons living in large cities, who are accustomed to high living, accompanied by brain pressure either of a business or social nature with too little exercise. The symptoms displayed refer to the digestive, nervous and renal systems, and the prognosis is good provided the incipient stage is not allowed to pass and an amendment of the manner and mode of life is assured, but if allowed to continue cardio-vascular changes will take place.

In the *gouty* diathesis the individual presents the characteristic signs of good health, as manifested by an active circulation, good digestion, sound teeth, thick hair, florid skin and high arterial pressure. The gouty diathesis, if permitted to continue, leads to cardio-vascular changes, bronchitis, asthma, digestive disturbances, as a persistent dyspepsia, or frequent attacks of "biliousness," migraine and neurasthenia. There seems to be a special predilection, as age advances, to arterial changes.

In the *scrofulous* or tuberculous diathesis the osseous system is poorly developed, the bones are small and slender, particularly the chest shows these deficiencies, the forehead large, hair slight and thin. The entire appearance presents evidences of defective nutrition. There is a predisposition to disease of the bones and glands, with feeble resistance to the tubercular germ.

In the *nervous* or *neuropathic* diathesis the individuals are active, restless and energetic.

The factors predisposing to the nervous diathesis according to Dr. John Nevin (Med. Ex. and Pract., Aug., '05) are as follows:

"This may be the result of a consanguineous marriage—a prolific source.

"It may arise from ancestral dissipation along the line of intemperance in the use of alcohol, opium or cocaine, or excessive venery."

Epilepsy, insanity, and other nervous troubles are closely identified, or may supervene as a result of this inherited tendency, according to the same author.

The lymphatic diathesis or status lymphaticus is rare and confined chiefly to young persons. It is char-

acterized by hyperplasia of the deep glands, particularly those of the pharyngeal, thoracic and abdominal regions. Unexpected death may occur from conditions and diseases that would not warrant it under ordinary circumstances, as convalescence from acute infections after the administration of antitoxin and anæsthesia.

Cachexia.— The term cachexia conveys to our minds anæmia or an impaired condition of the system.

It is a chronic condition, depends on the disease which produces it, and is primarily an impoverished state of the blood, which may precede the culmination or local manifestation of the disease.

Cancer, malaria, and syphilis are the affections with which it is chiefly associated.

The *cancerous cachexia* is shown in the general anæmia, with its attendant effects on the economy, together with progressive emaciation.

The *malarial* cachexia is at times typical and is recognized by the pale face, yellowish complexion, pale mucous membrane, soft muscles, dullness of mental powers, with inactive circulation, dry skin, and enlarged spleen.

The *syphilitic* cachexia is noted in the muddy color of the skin, constipation, general muscular weakness, sometimes prematurely gray hair and anæmia.

Family History.—The elucidation of the family history is one of the difficult problems an examiner is called upon to unravel.

This difficulty sometimes is seemingly insuperable and the solution calls forth our best energies and the exercise of our most tactful ability.

In many cases this is caused by a want of definite

and correct knowledge on the part of the applicant, or he becomes confused on account of his ignorance of medical terms, the inquirer presenting his questions too often in a technical manner and beyond the grasp of the ordinary individual; the examiner must frame his questions in such a way that he is thoroughly satisfied that they are fully comprehended by the applicant, and an erroneous construction or false interpretation cannot be made; again an obstinate disregard for the truth and a desire to conceal that which he may regard as damaging to his best interests is an obstacle encountered by those of large experience.

The importance of the question of family history cannot be too thoroughly understood, too literally construed, or too minutely explained.

In order that a practical application may be made of the data of the family history and their value in assisting in the estimation of their effect upon the life under consideration, we must remember the reciprocal dependence of allied diseases on a common cause and the atypical and diverse phases and expressions of essentially identical diseases.

Tuberculosis may manifest itself in the lungs in one member of the family, in another it may attack the glands, and still another it may find expression in the bones.

Rheumatism, disease of the heart, and renal calculi, all may have an ancestral cause emanating from the same source.

The nervous system also exhibits many examples of allied affections, presenting themselves in different forms in succeeding generations.

A knowledge of the family history enables us to arrive at an approximate duration of life in a family; we learn also of any predisposition to particular diseases or degenerations and the time of life at which they occurred. This gives us an idea of the mortality of the family with reference to the physiological phases of their lives. It may be necessary, sometimes, to investigate collateral branches of the family in order to obtain information confirming our assumption of some particular predisposing family characteristic.

It is always required of an examiner to give the age, if living, of the parents and grandparents, brothers and sisters, and if dead, the age at which death occurred, the cause and length of last illness, together with the existence of any pre-existing or predisposing disease.

In recording the cause of death meaningless and indefinite terms should be disregarded, inasmuch as they do not convey to the medical director the facts he must know.

The terms "old age," "child-birth," "cold," "dropsy," etc., should never be used, for they are often cloaks to cover other diseases, the disclosure of which would be a wound to family or personal pride, and are utterly useless as regards the authenticity of the real trouble. Some of these are symptoms only, and to the laity stand out prominently, but to the medical mind they are nothing but the spark that lights up some latent disease, which, in many cases, is of tubercular nature.

Heredity.— Under the head of heredity, and its influence on longevity, it must be understood that but

few diseases are absolutely hereditary. In the majority of instances they are not transmitted directly, but rather the soil is fertile for their reception; it is either the special type of tissue which they inherit or the peculiar conditions of the organs in which the metabolic process is impaired or imperfectly carried on, that is productive of the most marked predisposition to certain affections.

Atavistic transmission, or the eliminating of one generation, must be remembered, for this is distinctly manifested in some affections.

In addition to the special inherited tendencies, other circumstances exercise a causative influence on the subsequent history of the individual, because they are exposed in early life, at least, to the same surroundings and influences as that of their progenitors, and thus they begin, and, as their lives are unfolded and moulded into shape, an imprint is attached to their destiny not unlike that of their parents. This process, repeating itself through several generations, takes shape, and so gradually a type or class is established and we easily recognize family traits and peculiarities, both mental and physical.

The hereditary proclivities to disease are increased or decreased through marriage and its effect on the offspring. The introduction of new blood and its freedom from taint have an accumulated effect on the progeny; whereas consanguineous marriages or close blood relationship of the parents has the effect of intensifying all the taints, idiosyncracies, and abnormalities that already exist.

Great disparity of age existing between the parents

acts unfavorably on the offspring, in that the tendency is to inherit the peculiarities of the older parent, and the same vigorous constitution is not assured as in children begotten of parents near the same age.

In some cases the hereditary tendency to special diseases increases, as in families where arterial degenerations have been the prominent factors in the cause of death; the liability to these changes increases as the age advances; in others this tendency decreases, as in a family in which consumption has caused the death of several of its members, the liability to contraction of this disease diminishes as age advances.

Some families are long lived. This is a peculiar inherent quality in which the resistance to disease and external influences is so marked that the longevity is regarded as a distinct characteristic.

Some families are short lived, not from any particular hereditary tendency, but simply from the fact that they do not possess sufficiently strong resisting powers.

In all cases where an hereditary proclivity exists, due weight must be given to the applicant's present environment, for it has much to do with the prophylaxis and elimination of such tendencies.

The crystallization of the subject of heredity and its influence on disease distinguishes the following diseases as those most entitled to special consideration:

Alcoholism, apoplexy, cancer, diabetes, gout, hæmophilia, insanity, rheumatism, syphilis, and tuberculosis.

Heredity holds first place as a factor in the causation of *alcoholism.* The peculiar nervous degeneration of the parents is transmitted to the offspring, which in them becomes accentuated. This is shown by the large

number of alcoholics, who are found upon investigation to be children of those addicted to this excess or who have had some disease of the nervous system, which renders their offspring easy and almost natural victims. Anstie offers the following as his opinion:

"The nervous enfeeblement produced in an ancestor by great excesses in drink is reproduced in his various descendants with the effect of producing insanity in one, epilepsy in another, neuralgia in a third, alcoholic excess in a fourth, etc."

Green quoting LeGrain says:

"That 814 children born of parents who were alcoholics, 322 were degenerates and 174 died young. Of the survivors 17 per cent. were epileptic and 14 per cent. suffered from hysteria."

Apoplexy is markedly an hereditary disease. This tendency can be traced through several generations and may remain latent until the age at which it is most likely to occur; one of the characteristics is that in each succeeding generation this period is earlier, so that eventually the members of the family die before middle life.

Apoplexy is essentially due to arterial degeneration; therefore we must take into consideration all the vascular changes as manifested in sclerosis, interstitial nephritis and aneurism, for they all emanate from the same inherited proclivity.

Apoplexy is more frequent in men than women, because they are more subject to the predisposing influences by reason of excesses in eating and drinking, causing distention of the vessels by absorption of large quantities of liquids.

It is an assured fact that many cases of *cancer* can be credited to heredity. Sir J. Paget traced it in 1 out of 3; Mr. Sibley 1 out of 9; Thos. Bryant in 222 consecutive cases of his own 1 out of 10.

The liability to cancer increases after 45 years; therefore in those giving a history of this disease, the hazard increases as the age advances.

The co-existence of cancer and tuberculosis in many cases is an interesting study, and there may be some unexplained reason that may develop the fact of a peculiar alternating tissue type productive of these affections.

About one-third of all cases of diabetes can be traced to heredity. It affects men more frequently than women, 30 to 45 years being the ages of predilection, and is especially prone to occur in the Hebrew race.

Between 50 and 60 per cent. of all cases of *gout* are hereditary. It usually makes its appearance between 30 and 40 years of age, the inherited proclivity to this disease being about the same time in each generation.

This diathesis is sometimes seen in the form of a neuralgia, or it may be modified rheumatic attacks to which Hartshorn has given the name "gouty rheumatism"; again the seriousness of the hereditary influence of gout is more apparent when it is remembered that the resultant arterial changes arising from the same causes are manifested in its alternatives, apoplexy, arteriosclerosis and interstitial nephritis.

Hæmophilia probably affords the best and most striking example of hereditary transmission, and may exist in a family for many generations. The phenomenon of atavistic transmission is remarkably demonstrated in

this disease, in that it often skips one generation as shown in a granddaughter who is not a bleeder herself but transmits it to her son; another peculiar characteristic is that it is almost always transmitted through the females to the male members of a family, therefore the males known to have an ancestral history of hæmophilia are hazardous risks.

The most important factor in the production of *insanity* is heredity. Fully three-fourths of all cases can be attributed directly to some form of this disease in their ancestors, cerebromental disease or one of the neuroses or psychoneuroses, one of the degenerative or developed forms, it matters not for they are interchangeable. Epilepsy, syphilis, alcoholism, apoplexy are all closely allied to the productiveness of insanity.

The degree to which insanity may be expected to develop depends on the number of cases of insanity and allied diseases that have appeared in both branches of the families.

According to Folsom, great geniuses and men of extraordinary talent appear in families tainted with insanity, and few families have had distinguished men among them without also showing a considerable number of insane members. It has been observed that children and grandchildren of men distinguished for their great intellectual powers are subjects of degenerative and mental disorders or at least are of less than ordinary mental capacity and moral force.

The *rheumatic* tendency is transmitted and makes those born of rheumatic ancestors more liable than others to the disease in the proportion of 5 to 1, according to Thompson, or, if its prevalence is observed in

antecedent degenerations, it is not unusual for it to develop into a persistent or recurrent type.

SYPHILIS.—This may be inherited from one or both parents and first born children are more likely to suffer than those born at a later date, it being presumed that the parents were infected prior to the birth of all.

This disease is more likely to be transmitted from the father, although the mother may transmit it if she alone is syphilitic, but the chances are more remote than if the father alone is syphilitic; the disease, however, may be transmitted through the placental circulation when contraction of the disease takes place subsequent to conception.

A healthy mother may give birth to a syphilitic child without herself becoming infected, because, according to Hutchinson, the modified syphilis acquired gives immunity to her under the circumstances and bears the same relation to her as vaccinia does to variola.

Parents suffering from tertiary lesions do not produce syphilitic children, but they are cachectic and a supervention of epilepsy or deficient mental capacity is almost sure to result.

After the discovery of the tubercle bacillus, the hereditary nature of *tuberculosis* was relegated somewhat to the rear and it was classed as an infectious disease, and the inherited predisposition to feeble resistance and the association with those suffering from the disease proclaimed as the reasons for the great mortality shown in families. But recently medical opinion has again changed and is reverting towards the direct transmission or congenital inheritance of the dis-

ease in many cases; this is more frequent than is generally supposed.

Welsh has noted the great frequency of tuberculosis of the placenta in tuberculous women. He asserts that lesions of the placenta are found in many cases in women suffering from scarcely more than the manifestations of incipient tuberculosis to the advanced stages. The disease, however, must be active and not in the quiescent form. He is also of the opinion that the strain of pregnancy is sufficient to awaken a latent tuberculosis.

Both of these views must be accepted as causes, and from an insurance standpoint it is a well established fact that heavy mortality is experienced from those having lost near relatives from this disease.

Medical History.—The general health record and the exact previous medical history of the applicant must be known in order that we may exclude those diseases usually occurring but once, may give special attention to those predisposing to subsequent attacks and may seek for phenomena and secondary processes in those diseases known to have sequelæ.

The medical history is of great importance, therefore, and probably the chief foundation stone upon which the medical director bases his opinions.

Specific answers to direct questions must be insisted on, inferential generalities must not be indulged in, evasive or implied negative replies must not be accepted.

No ailment or symptom, however unimportant it may appear to the applicant, is unworthy of the closest scrutiny on our part, for many of these apparently

trivial ailments have a distinct bearing and a correlative relation to the assurability of the individual.

The points to be determined, after excluding those diseases that usually do not occur the second time, are whether or not the disease has appeared more than once, for some affections are notably recurrent or prone to chronicity. In this class may be included asthma, gout, gall stones, pneumonia, malaria, and rheumatism, any one of which renders the individual susceptible to subsequent attacks.

In other diseases, such as syphilis, gonorrhœa, rheumatism again included, and scarlet fever, the sequelæ have a decidedly unfavorable influence on life, because these secondary changes cause degenerations and disturbances of nutrition, which may destroy life prematurely.

If a history of nervous trouble is found, it is well to inquire into the childhood diseases of the individual, for often the infectious diseases of this age are followed by lesions of the brain which have a marked influence on the character, temperament and mental abilities of the child; therefore careful inquiry as to the progress made in school, his attainments at this time of life, and all incidents connected with him in comparison with others of this age should be made.

In other words, ascertain if he was "backward" in childhood. This history, particularly, if associated with an ancestral history of alcoholism, epilepsy, insanity or syphilis is of the greatest value in accounting for morbid mental phenomena of the nervous system in later life.

In reference to the lungs, the disease pre-eminent

among those followed by serious results is pleurisy. This is so not only on account of its sequelæ, but because the cause leading to the development of a pleurisy makes the ultimate prognosis grave.

When a history of this disease is given a very careful inquiry should be made, for it may be of a rheumatic or tubercular origin; the pleura many times is the primary seat of a tubercular infection of the lungs; or pleurisy may occur as a secondary process by extension from a contiguous structure; thus it may precede for several years a tubercular infection of the glands or bones, and previous to its actual occurrence in the lungs comparatively good health is often enjoyed.

When an applicant gives a history of acute rheumatism, it matters not how slight the attack may be, the heart must be carefully examined, for endocarditis occurs in about one-fourth of all cases. A history of gout or cutaneous lesions depending on a rheumatic or gouty condition of the system, should lead us to examine the heart with extreme care for any changes.

The occurrence of persistent or recurrent gastric disturbances should make us apprehensive as to its being a secondary manifestation of some constitutional disease of the heart, lungs, or kidneys; when dietetic and local causes are excluded, a very searching investigation for the determination of the cause is the only course open to us.

Diseases of the liver are rarely primary, but are secondary to disease elsewhere. Almost all organic diseases or deranged states of the system have a disturbing influence on the liver; therefore, if a history of an affection of this organ is given, the complete medical

history of an applicant is essential and the ætiological factors must be known in order that a correct diagnosis may be established; again it must be remembered that diseases of the liver occur later in life, or at the time when the productive factors are most likely to appear.

The congestions are usually secondary to heart trouble, cirrhosis to alcoholism or the infections, abscess to dysentery or suppurative appendicitis, amyloid disease to tuberculosis, syphilis and other suppurative processes, interstitial hepatitis, and gumma to syphilis.

Appreciation of the sequelæ of gonorrhœa will assist in accounting for the tube and ovarian affections in the female, a cystitis or pyelitis in both sexes and also in affections of the joints in some cases as manifested in a gonorrhœal arthritis.

The infection of gonorrhœa primarily exerts its influence on the adnexæ of the genital organs in both sexes.

Subjective Symptoms.—The symptoms that are appreciated only by the applicant are very frequently omitted in an examination for obvious reasons, and their significance is not as fully valued, as a rule, as their importance justifies. A shrewd examiner, however, will avail himself of every opportunity to investigate and bring to light all such symptoms and apply them to the case as their seriousness may demand.

The value of subjective symptoms depends both on the applicants and on the examiner.

The peculiarities and eccentricities of the former render them of different grades of susceptibility to pain. To one it might be a hardship to bear, to another

merely a discomfort, and again in their disturbed state of mind, the degree with which they regard their sensations as increasing or diminishing, their forgetfulness or inability to understand the symptoms, or their logical sequences, make it difficult to establish a rule with any degree of certainty, whereby a standard for comparison can be established, and a definite and exact interpretation can be placed on each symptom.

With regard to the latter a premature or immature conception is sometimes formed because of hasty conclusions or a superficial knowledge of the real meaning of such symptoms.

The general subjective symptoms are caused by the derangement or abnormal condition of more than one organ.

They are not in themselves of special diagnostic importance, but, taken in conjunction with other symptoms, they assist in revealing the true nature of some obscure malady.

The feeling of exhilaration, accompanied by the applicant's idea of his ability to perform great mental or physical feats, is usually one of the phases of paretic dementia.

Muscular weakness or a feeling of exhaustion with mental depression is likely to be due to neurasthenia when it is known that he can respond under pressure; the real prostration of diabetes is an example of an individual's inability to continue physical or mental labor; no matter how urgent the case, he is unable to respond.

The special subjective symptoms have reference to the special senses. As often occurs, a person may be

absolutely blind in one eye and yet this cannot be detected without the applicant's co-operation.

Defective hearing can be at once detected, but its degree, particularly in pension examinations, is taken advantage of by malingerers.

Anæsthesia and hyperæsthesia are present in many nervous persons as well as defects of taste and smell. These symptoms are associated in many cases with well defined diseases; they, however, may exist without any appreciable cause; thus some persons with neurasthenia present few or no symptoms that can be observed and are confined entirely to their own sensations.

The after effects of heat prostration present only subjective sensations and symptoms rendering the person unfit in some cases to follow his or her usual vocation.

Under this head may be considered such diseases as the neuralgias, muscular rheumatism, lumbago, constipation, and dyspepsia.

The conclusion drawn from a study of the subjective symptoms is that a condition exists not present in health. Whatever may be the cause, it is responsible for these continued manifestations of ill health, and a comprehensive knowledge of the underlying pathological processes must be known in order that their significance may be appreciated in the estimation of their influence on the longevity of the life under consideration.

CHAPTER V

PHYSICAL EXAMINATION OF THE CHEST

Introduction.— The great mortality resulting from diseases of the lungs and heart is well known to those directly interested in life insurance, and in view of this fact great care must be exercised in the examination of this region, with particular attention directed to the value of the detection of diseases of these organs in their incipiency.

This often entails extra work on our part and requires great precision and accuracy of judgment, but in after years it is with pardonable pride and self satisfaction that we contemplate the results of our work and see our opinions confirmed.

The value of a physical examination of the lungs and heart depends on the accuracy of the examiner's knowledge of the topographical anatomy of the parts, or the relation of the various organs within the chest to the chest wall and its surface and to each other, together with a correct knowledge of the normal sounds and a precise interpretation of the adventitious and abnormal sounds.

Topographical Anatomy of the Chest (Regional Anatomy).— For the purpose of description and in order that a clear understanding of the relation of the organs to the surface, and an intelligent recording of diseases in localized areas can be made, arbitrary imaginary vertical and horizontal lines are conceived

to have been drawn on the front, sides, and back of the chest, dividing it into regions.

A clear and accurate knowledge of these land-marks is absolutely essential for the determination, location and position of the organs immediately beneath.

The imaginary vertical lines are:

(1) The sternal line, running parallel with the edge of the sternum.

(2) The para-sternal line, parallel to the sternum and midway between the edge of the sternum and the mid-clavicular line, which generally passes through the nipple.

(3) Mid-clavicular line is a vertical line drawn from the middle of the clavicle.

(4) Anterior axillary line is a vertical line from the anterior fold of the axilla.

(5) Posterior axillary line is a vertical from the posterior fold of the axilla.

(6) Scapular line is drawn vertically through the inferior angle of the scapula.

The horizontal lines in front are:

(1) A line drawn through the clavicles.

(2) A line drawn through the third chondro-sternal articulation.

(3) A line through the sixth chondro-sternal articulation.

The lines on the back are:

(1) A line drawn through the spines of the scapulæ.

(2) A line drawn through the inferior angles of the scapulæ.

The anterior regions of the chest are:

(1) Supra-clavicular region, the space above the clavicle.

(2) Infra-clavicular region extending from the clavicle to the third rib.

(3) Mammary region between the third and sixth ribs.

Laterally the region is divided by the sixth rib into the axillary and infra-axillary spaces.

The posterior regions of the chest are:

(1) Scapular region, that covered by the scapula.
(2) Supra-scapular region above the spines of the scapulæ.
(3) Infra-scapular region, below the inferior angles of the scapulæ.
(4) Inter-scapular region, between the scapulæ.

A convenient method for counting the ribs is to pass the finger downward on the sternum from the top until it comes in contact with the transverse projection, which is the junction of the first and second portions; this is on a level with the second rib and can always be felt; from the second rib the others can be counted downward and traced to the axilla.

The intercostal spaces have the same numbers as the ribs; the number of the interspace corresponds to the rib above it.

The upper angle of the scapula is on a level with the second rib, and the lower angle on a level with the seventh rib or seventh interspace.

The nipple in the male corresponds to the fourth interspace.

Preparatory to the proper examination of the chest, it must be your invariable practice to request the applicant to remove all of his clothing to the waist. He may be permitted to wear a thin undershirt, which will not seriously interfere with a thorough and complete examination because of the facility with which it can be arranged.

Women must be requested to remove the corset and all other articles of clothing that are likely to offer any obstacle to a careful and thorough examination.

In all cases, however, the upper part of the chest

must be absolutely bare, in order that the apices of the lungs may be rigidly examined for early manifestations of tuberculosis.

Inspection.—A thorough inspection of the chest is made from an anterior, lateral, and posterior point of view, also from above downward, *i.e.*, standing behind the applicant. This gives us a full knowledge of the contour of the chest, and enables us to detect any inequalities or lack of expansion and symmetry and, with the oblique light, any pulsations or abnormalities in its movements.

The shape of the thorax, including any deformities that may exist, has much to do with our ultimate disposition of a case, because of the limited breathing capacity existing under these conditions, which increases or causes a predisposition to pulmonary disease.

The Normal Chest.—To fully appreciate the difference between a normally and an abnormally shaped chest an examiner must be familiar with the recognized type of a healthy chest.

The normal, healthy chest has the shape of an ellipse, which is the shape of its transverse section. The anterio-posterior diameter is about one-fourth less than its transverse diameter. It is well developed and symmetrical, the right side being a little larger than the left. The sternum should project forward from above downward, the ribs having the proper angle and curve, the whole covered with a moderate amount of fat and the respiratory muscles well developed.

The Flat Chest.—A flat chest, as the name signifies, is one in which the anterior-posterior diameter is lessened, the cartilage being more or less straight and with-

out the normal anterior convexity, thus making a transverse section almost a circle. A chest of this shape indicates a predisposition to phthisis.

The Barrel-shaped Chest.—This chest is one that has the appearance of full or extreme expansion. The ribs are raised, making the epigastric angle broad, the interspaces narrow, the shoulders elevated and rounded, the sternum and spine curved, the anterior-posterior diameter increased.

The breathing in this type of chest is vertical, the expansive character being almost eliminated. In fact, full expansion is less than two inches, the respirations being rapid with prolonged expiration.

This type is seen in emphysema, and is typical of this disease, although it is not invariably present in it.

The Altar Chest.—In this chest the neck is long, larynx prominent, sloping shoulders, scapulæ prominent or wing like, great obliquity of the ribs, making the epigastric angle acute, wide intercostal spaces, the anterior-posterior diameter decreased.

This chest is long, narrow and flat, and constitutes what is known as the phthisical or tuberculous chest. The cause is found chiefly in a general reduction of the contents, and as a consequence expansion is much diminished.

The Pigeon Breast and Rachitic Chest.—These are recognized abnormal types, and the names are sufficiently descriptive. They do not indicate disease of the lungs, but are evidence of rickets or some obstruction in the nasal cavity in childhood.

The Funnel Breast.—In this the lower sternum forms a concavity, with a general constriction of the

lower part of the chest. As a rule this is congenital and is often a family characteristic and may be associated with other stigmata of degeneracy.

Unilateral Enlargement.—This gives to the side affected a prominence, particularly at the base. The ribs are raised, making the costal angle more obtuse. The scapulæ are displaced outwardly, making the space between the scapulæ and spine greater on the affected side. The intercostal spaces may be obliterated or bulging. Sometimes they alone participate, their bulging being the only evidence of enlargement.

The causes producing this condition are an increase of the normal contents, which is usually compensatory or due to the presence of fluids.

The movements of the chest are restricted or not, depending entirely on the cause.

Unilateral Contraction.—This gives to the side affected a general diminution in size. The semicircumference and diameters of the side are less than the opposite side, the costal angle is more acute and the scapulæ approach nearer to the spine. The causes are usually found to be the result of long continued pleural effusion, cirrhosis of the lungs or cancer. The movement is necessarily restricted.

Local Enlargement, Contraction, or Depression.—It is of the utmost importance to observe any local enlargement or contraction, for their existence points unerringly to some morbid condition.

The local enlargement occurring in the præcordial region will be discussed under diseases of the heart. Aside from these causes, it may be due to a pulsating

pleurisy (often of tubercular origin) an aneurism or enlargement of the liver.

Local contractions or depressions may be the result of injuries, pleuritic adhesions or tuberculosis. Generally, local contractions are the result of the causes producing unilateral contraction.

Particular attention is directed to the supra-clavicular and supra-scapular regions. Depressions here, especially if unilateral, are strongly suggestive of an existing or an arrested tuberculosis where other causes are excluded.

In local contractions the chest movements are modified on the affected side.

CHAPTER VI

PHYSICAL EXAMINATION OF THE CHEST (Cont'd.) THE LUNGS

Inspection.—Inspection of the chest affords an opportunity to study the type, rate, and rhythm of respiration, and the diaphragm phenomenon of Litten.

Types.—The costal or upper thoracic type is seen most frequently and is confined more to the upper part of the thorax, the mode and manner being chiefly responsible, with perhaps an hereditary influence.

This type in a man, or existing to excess in a woman, is abnormal and is suggestive of disease. It may be the result of paralysis or pressure on the diaphragm from tympanites, ascites, or tumors in the abdomen.

The diaphragmatic type is the recognized normal type in men, the entire chest expands in all of its diameters, the lower part participating mostly in the respiratory cycle.

If this type is exaggerated in men or the thoracic type is diminished or absent, and this type predominates in women, it is abnormal and caused by any condition rendering the movements of the chest painful, such as pleurodynia or fracture of a rib, emphysema (permanent expansion throwing extra work on the diaphragm), calcification of the costal cartilages, ossifying myositis, or paralysis of the muscles of inspiration.

The costal type is seen in children, and during sleep it is observed in both sexes.

Rate or Frequency of Respiration.—In a healthy adult male the number of respirations per minute is from 16 to 24; in the female it is from 18 to 22.

This number will vary with the mental state of the applicant and is increased in frequency when standing, during bodily exertion, during the process of digestion and in all forms of dyspnœa, q. v.

A decrease in frequency is seen in diseases of the medulla and in cases of drug addictions.

Rhythm.—Normally, respiration is an involuntary action; inspiration is active and shorter than expiration, which is passive. The ratio in health is 5 : 6.

Any disturbance of the normal ratio, whether it is an increase in the length of either inspiration or expiration, is indicative of some pathological process.

An increase in the length of inspiration is seen in obstructions to the free ingress of the air into the lungs. It may be laryngeal or tracheal, or a stasis of the pulmonary circulation.

An increase in the length of expiration is seen in asthma and emphysema (which is due to difficulty in getting the air out of the lungs in consequence of a loss of elasticity) and is one of the earliest signs of tuberculosis.

The jerking inspiration is the pathological condition, chiefly interesting to the examiner in connection with disturbance of the inspiratory act, and it must be remembered that prolonged expiration is associated with it when due to a morbid process. It is seen in nervous persons without physical signs and is not diagnostic.

It is observed in asthma, aneurism (pressing on a bronchus), or pressure on a portion of the lung from any cause, and occurs in the early stages of tuberculosis.

The Cheyne-Stokes and the stertorous breathing represent other alterations of the rhythm, but the conditions causing them are not likely to be encountered by an examiner.

The Diaphragm Phenomenon of Litten. — This phenomenon illustrates the vital capacity or volume of the lungs and is valuable in estimating the mobility of the lower part of the lungs in all cases where doubt arises.

By this phenomenon the movements of the diaphragm can be observed on the surface of the chest by a shadowy line that moves downward during inspiration, beginning about the sixth rib or interspace on either side, and disappearing after passing two or more spaces, or as it approaches the costal margin. During expiration it begins below and moves upward.

In order that this phenomenon may be clearly seen, the applicant must lie on his back, head and shoulders slightly elevated, the light should come from one window and fall from head to foot, the face being turned from the source of light.

The examiner must stand 4 to 6 feet from the applicant, opposite his head, with his back to the light, and observe the chest at an angle of about 45 degrees.

This sign can be elicited in all normal chests that are not covered too thickly with fat and should move about 2½ inches.

It is not seen in effusions or pleural adhesions or tumors of the lower part of the lungs, and is diminished

in emphysema and tuberculosis even when it is confined to the apices, indicating that respiratory capacity is lessened.

In conditions existing below the diaphragm this sign is unaltered.

Mensuration.— The lung power or vital capacity is estimated by the amount of chest expansion.

Measuring the circumference of the chest at the end of complete inspiration and again at the end of complete expiration gives us the number of inches of expansion from which the estimation is made.

In order that a correct reading may be obtained, it is essential that care be exercised and the following technic be observed: The tape should be passed horizontally around the chest on a level with the nipple in men and under the axilla in women. One end of the tape must be fixed in the median line, the other portion held in the hand and allowed to move with inspiration and expiration.

In stout persons the tape must be drawn tight.

The difference between the reading of inspiration and expiration in health should be from 2 to 4 inches.

Normal Expansion.—It must be remembered that the expansion will vary according to the environments, age, and occupation of the individual, but in men of normal physique and proportion the circumference of the chest should not be less than one-half of the height, and the difference between full inspiration and full expiration should not be less than one-tenth of the maximum chest measurement.

Some individuals do not know how to expand their

chests, and in these cases the examiner must exemplify the method of procedure.

Deficient Expansion.— The expansion of two inches or less in men is below the normal. This is regarded as deficient and they are not acceptable because their resistance to lung troubles is less and their vital capacity is weakened.

A deficient or generally poor expansion may be due to existing diseases, such as aneurism or mediastinal tumors, causing pressure on the trachea, asthma, emphysema, causing the lungs to be in a constant state of distension, so that they cannot much further expand, or incipient tuberculosis.

An unilateral deficiency denotes a diseased condition which prevents a full inflation of the lung, and may be the result of mechanical obstruction, as pleural adhesions or pressure, as detailed above, or again it may be due to a disease confined to one lung, as phthisis or cancer.

A local deficiency, if below the clavicle, may be an incipient tuberculosis; if in other regions, it is probably caused by pleural or præcordial adhesions, according to location.

Extreme Expansion.— An expansion of five inches or more is looked upon with suspicion for this extreme is usually found in athletes, who, from excessive training, are subject to heart and lung diseases.

A coincidence is met with sometimes in consumptives, in that they have a large expansion, which is developed from practice.

Therefore a very small or very large expansion calls

for a careful examination and a full report in regard to the cause.

Palpation of the Chest.—Palpation must be practiced with the chest bare and is of service in verifying the results obtained by inspection as to chest movements, lung expansion and pulsations, and, in addition, the presence of tenderness, size, and general characteristics of tumors and growths and the perception of vibrations produced by the voice, or rhonchi.

Vocal Fremitus.—Vocal fremitus is the result of the vibrations of air, beginning in the vocal cords, transmitted to the chest wall through the columns of air in the trachea and bronchial tubes. The method by which this is best detected is to place the warmed hands or ulnar surfaces of the hand on each side of the chest at corresponding points and direct the applicant to count 1—2—3 or repeat some word, and note the resultant vibrations. (It is well to use the same figures or words at all times in order to familiarize ourselves with the character of these vibrations in health so that we can more readily detect an abnormality in disease.)

The fremitus will vary according to the pitch and loudness of the voice and the character of the media through which the vibrations must pass.

A low pitched voice renders the vibrations slower, therefore stronger. It is more distinct if the chest wall is thin, and in men than women.

It is stronger normally on the right side, hence if the fremitus of the left lung equals that of the right or exceeds it, a careful examination must be made of it for tubercular lesions.

Practice will enable the examiner, through familiar-

ity with different chests and voices, to determine what is normal in individual cases.

Any marked difference in fremitus should lead to a very thorough examination of the lungs.

An increase is marked in all cases where the conducting medium is denser than normal lung tissue, therefore consolidation from any cause (tuberculosis, pleural adhesion, bands, or tumors between a bronchus and the chest wall) facilitates the conduction of the vibrations.

A cavity acting as a resonator increases it.

A diminished or absent fremitus is observed in all cases where the intervention of a substance of different structure exists, such as air or fluid in the pleural cavity, thickened pleura, the pressure of a tumor, an aneurism or enlarged glands on a bronchus (causing partial or entire occlusion), or a cavity filled with fluid.

These conditions represent the most important modifications of vocal fremitus interesting to the examiner. It must be remembered, however, that the variations existing normally, attributable to the intensity and pitch of the voice, and to the amount of fat on the chest, together with the normal difference in favor of a more pronounced fremitus on the right side, which is normally slighter in women and children, are not abnormal, but exist under normal conditions.

Rhonchal fremitus is coarse and is observed in asthma, or is sometimes caused locally by air passing through fluid in a cavity.

Percussion of the Lungs.—Percussion is practiced in order to determine whether the part percussed elicits a resonant sound or vibrates with a degree of uniform-

ity and regularity, or a non-resonant (or dull) sound, where the vibrations do not possess this quality, indicating that the proportion of air to solid tissue is less, and also in order to estimate the degree of resistance to the percussing finger.

The practical results of percussion are the determination of a more or less than normal amount of air contained in air-containing organs; the outlining of non-resonant or airless organs and the presence of fluid or tumors interposed or existing.

The force of the blow determines the amount and depth of tissue thrown into vibration and the elegance and refinements of percussion are destroyed if an uniform blow is constantly employed.

Therefore a modification of the blow or stroke is necessary according to the results desired.

Light or gentle percussion is so directed that the immediately underlying tissues are thrown into vibration, the sound elicited being from this alone. This form is useful and applicable when dealing with a thin wall, or when a resonant body overlies a non-resonant one.

Superficial percussion of the lung overlying the liver will give a resonant note, while deep percussion will give a non-resonant or dull note.

In strong or deep percussion the blow must be delivered with a force sufficient to throw into vibration the parts deeply situated.

This form is practiced and is necessary when the chest wall is thick or when it is desired to outline a non-resonant body beneath a resonant one, such as deep-seated consolidations, aneurism, or tumors.

Deep percussion of the liver lying beneath lung tissue will give a relative dulness corresponding to the outline of the organ.

Practice enables us to adapt the stroke to the conditions existing and the results desired, and to differentiate between relative and absolute dulness in defining the limits of organs or abnormal growths in deep percussion.

TECHNIC OF PERCUSSION.—In this, as in other matters, dexterity and skill are acquired and obtained by practice. Just as good results can be attained with an artificial pleximeter and plessor as with the hands alone, but it is apparent to all, that the sense of touch, combined with that of hearing, offers advantages not obtained by any artificial method.

If the finger is used as a pleximeter, the middle finger of the left hand is preferable. It must be placed parallel with the ribs in the interspaces and closely in contact with the chest wall; from above downward each interspace must be percussed.

If the finger is used as a plessor, the middle finger of the right hand is preferable. It is better to use one finger only, bent at a right angle and held rigid. The percussion movement should be from the wrist, not from the elbow. The blow must be delivered on the middle phalanx of the pleximeter finger, striking it perpendicularly and quickly, the finger rebounding instantly, the blows being regular, even in force, and five or six in number.

The best position of the applicant during percussion is the standing one, the arms hanging loosely at the sides and all muscles relaxed, their tension modifying

the note; during percussion of the posterior part of the chest the arms must be folded and the body inclined slightly forward; during percussion of the axilla the hands must be placed on the head.

Analysis of Sounds.—Tones are produced by periodic vibrations of sound-waves, and noises by non-periodic vibrations.

The consideration of the different elements of sounds is necessary in estimating their fundamental characteristics.

The volume, pitch, duration, and *quality* are the elements by which their value and significance are determined.

VOLUME.—The volume or intensity of sound depends on the amplitude of the vibrations and their energy; therefore, intensity increases with the amplitude and is altered by the degree of force used.

PITCH.—The pitch may be high or low and depends on vibration frequency, the greater the number of vibrations per second, the higher the pitch.

DURATION.—The duration depends on the length and the amplitude of the vibrations; high pitched sounds are diminished in volume and are of short duration; low pitched sounds are greater in volume and longer duration.

QUALITY.—Quality is that element of sound by which one tone having the same pitch and intensity is distinguished from another. As an illustration, it is by this element that you are able to recognize a person in the dark by his voice, the varieties in qualities being many.

The different elements may be concisely stated as follows:

(1) The volume depends on the amplitude and energy of the vibrations.
(2) The pitch depends on vibration frequency.
(3) The duration depends on the length and amplitude of the vibrations.
(4) Quality depends on the form of the wave.

TYPES OF NORMAL PERCUSSION SOUNDS.—The different sounds elicited by percussion normally and used as a basis for all modifications are resonance, tympany, and dulness.

Familiarity with them is obtained by practice and the qualifying terms used to designate the variation, as one sound imperceptibly merges into another, or when one sound cannot be distinctly and definitely classed, are acquired by the same means.

Pulmonary resonance is descriptive of the clear sound elicited by percussion over normal lung tissue.

Tympany is the sound produced by percussion over a smooth walled cavity containing air; it is of low pitch and long duration and has a metallic quality which renders it distinctive; it is best elicited over an empty stomach.

Dulness is the percussion sound heard over airless bodies or cavities containing fluid; when it is absolute it is called flat, and when elicited through an intervening air-containing body relative dulness is the term used. Absolute dulness is elicited over the heart and liver and is easily recognized, while relative dulness will vary according to the method employed and the experience and acuteness of hearing of the examiner.

The degree of resistance offered to the pleximeter finger will vary according to the decrease of air in the body percussed. Normal lung tissue offers the least and an absolutely solid structure offers the most resistance.

The value of this, also, is appreciated by experience, and in all cases where it is difficult to determine the pitch the resistance assists in the detection of the proportion of air or the presence or absence of a solid structure.

VARIATIONS OF THE NORMAL SOUNDS IN HEALTH. —The resonance or clearness varies normally in the different regions of the chest.

A knowledge of this must be thoroughly impressed on our minds in order that the distinctive differences can be appreciated and abnormalities differentiated from characteristic modifications.

The sounds are modified and less clear in proportion to the amount of fat on the chest wall and the age of the applicant. The resiliency of the wall is less and the rigidity more as the age advances. The scapulæ and great muscular development render the sounds less clear.

In the supra-scapular spaces the resonance is pure and clear, with a slightly higher pitch on the right side, becoming tympanitic over the trachæ.

In the infra-scapular spaces the clear pulmonary resonance is well marked in the mammillary line, slightly higher on the right side, and becoming tympanitic as the median line is approached, and is slightly diminished in pulmonary quality as the mid-axillary line is approached.

In the mammary region the sound is modified and the pitch changes as the liver is approached on the right side; on the left the heart destroys the sound below the fourth interspace and dulness replaces the pulmonary resonance.

The axillary spaces above the sixth rib give pulmonary resonance. Below this rib on the right side the liver modifies the sound, and on the left side, "Traube's Space," the sound is tympanitic from the stomach or perhaps dull from the spleen.

On the posterior part of the chest the supra-scapular spaces give a resonance less clear than in front.

In the inter-scapular space the sound is higher in pitch toward the median line.

In the scapular spaces the sound is muffled and deep percussion is required to elicit the resonance.

In the infra-scapular spaces the resonance is less muffled, but pulmonary resonance is elicited with only a fair degree of clearness.

Percussion in Disease of the Lungs.—The criterion by which modifications and departures are judged is the normal pulmonary resonance.

This percussion note may be (1) Higher-pitched than normal, hyper-resonance and tympany. (2) It may be duller than normal, diminished or impaired resonance, slight or marked dulness and flatness. (3) Modifications of the normal resonance, with added qualities or alterations in pitch over cavities, depending for their development on special adaptation or arrangement of the person, cracked-pot sound, amphoric resonance, Wintrich's phenomenon, interrupted Wint-

rich's phenomenon, Gerhardt's sign, Friedreich's phenomenon, Biermer's sign, coin percussion.

Hyper-resonance.— Hyper-resonance is an exaggerated or increased resonance, without the metallic quality of tympany. It is simply clearer and fuller than the pulmonary resonance in health.

Hyper-resonance is caused by a greater amount of air under the percussed area in proportion to solid tissue than normal.

If this sound is detected bilaterally it denotes emphysema and is characteristic of this disease and caused by the extreme distension of the air cells.

If this increased resonance is heard unilaterally, it denotes a greater amount of air in one lung, and is caused by a compensatory emphysema from a crippled opposite lung.

A local increased resonance is due to a local compensatory condition, and deep percussion will often enable us to recognize a deep seated consolidation beneath the area of hyper-resonance, which is the cause of the distension of the air cells in its immediate vicinity.

Skodaic resonance.— This note is heard in the upper part of the lung above pleural effusions. Pneumonia, pulmonary œdema, and certain cases of apical tuberculosis are due to a relaxed condition of lung tissue near the lesion.

In reference to the last named condition, Green says: "It may prove a most puzzling sign and frequently leads the examining physician into a futile search for a lesion in the sound lung, he mistaking the tympanitic

or hyper-resonant note of the affected side for the normal standard."

Tympany.— This indicates a diseased condition if elicited over an area where pulmonary resonance is found in health.

The pitch and volume will vary according to the size of the cavity, the size of the communicating channel and the tension of the walls.

High pitch is elicited when the cavity is small, the channel small, and the tension great; low pitch when the cavity is large, opening large, and tension less.

If tympany is heard bilaterally it denotes extreme distension of the air cells and produced by emphysema, the tympanitic note replacing the hyper-resonant note.

Unilaterally it may be due to a pneumothorax or a compensatory emphysema.

In the former the pitch may be raised if the tension is great and is known as dull-tympany.

Locally tympany may arise from an emphysematous condition of one lobe of the lung, it may be due to a cavity communicating with a bronchus, or, if heard below an apical dulness, it is the result of conduction from a bronchus by reason of the consolidation.

Diminished or Impaired Resonance.— In proportion to the decrease or reduction in the amount of air in the lung tissue under the area percussed the normal sound is replaced by impaired resonance.

This is of particular significance when found in the apices of the lungs, denoting early infiltration of tuberculosis.

Dulness is another degree of impaired resonance, indicating a smaller amount of air in proportion to solid

tissue, and the variations in the degree correspond to the denseness and size of the involved areas.

According to Butler, " In order to cause appreciable dulness, the consolidation must be at least 1½ inches in diameter and lie just beneath the chest wall; more remote airless portions must be larger and not lie deeper than 2½ to 3 inches." In these cases increased resistance to the pleximeter finger must be remembered.

Flatness or absolute dulness denotes an entire lack of air, and is elicited in pleural effusions, abscess, filled cavities of phthisis, tumors, empyema, and thickened pleura.

CRACKED-POT SOUND.—It is a tympanitic sound, resembling the sound heard when a cracked metal vessel is struck, and can be imitated by clasping the hands loosely and striking them over the knee.

It is heard in percussing cavities, having a direct communication with a bronchus in thin chest walls.

The following technic is required to elicit this sound: The mouth should be open and the percussion practiced during expiration, the stroke must be strong and the plessor finger allowed to remain on the pleximeter finger after the blow, thus adding an impulse, which materially assists in rendering this sound more distinct.

It may be heard also in a healthy chest of a crying infant, a communicating pneumothorax, above pleural effusions, and in pneumonia before consolidation.

AMPHORIC RESONANCE.—This is a tympanitic sound with the addition of a peculiar metallic clang or echo. It is imitated by percussing an empty vessel.

The significance of this sound is that it indicates either a pneumothorax or a large cavity near the sur-

face, with smooth walls, and communicating with a bronchus, and is best elicited with the person's mouth open.

A differential diagnosis is made between these two conditions by the more confined area over which the sound is heard in cavities.

Wintrich's Phenomenon.—If the percussion note is raised in pitch and louder when the mouth is open, *i.e.*, changes when the individual alternately opens and closes his mouth, and is more distinctly tympanitic when the mouth is open, it indicates a cavity having free access with a bronchus or a pneumothorax with a large opening. The explanation of this phenomenon is that the pharynx acts as a resonator when the *mouth* is open by the transmission of the percussion vibrations through the air columns in the bronchus and trachea over the cavity.

INTERRUPTED WINTRICH'S PHENOMENON. — If Wintrich's phenomenon can be elicited when the person is in one position, and is indistinct or disappears when in another, it indicates positively a cavity containing fluid, the alterations in the position either causing occlusion of the communicating bronchus or leaving it open to the cavity.

Gerhardt's Sign.— If the pitch of the percussion note changes with the posture of the person, it denotes a cavity partly filled with fluid and longer in one of its diameters. It is due to the change in shape of the cavity formed by the mobility of the fluid.

Friedreich's Phenomenon.— The percussion sound over a cavity opening into a bronchus is higher in pitch during and at the end of inspiration than after expira-

tion. This respiratory change is due to an increased tension of the cavity walls and chest walls and a widening of the glottis.

Biermer's Sign.—In pneumohydrothorax the percussion note changes to a lower pitch when the person is in the recumbent position, owing to a change of the shape of the cavity by reason of the change of the position of the air and fluid.

Coin Percussion.—This sound is elicited in pneumothorax according to the following technic:

A stethoscope is placed on the back and an assistant percusses on the front of the chest, using two coins (50 cent pieces), one as a pleximeter and the edge of the other as a plessor. If air is in the pleural cavity it will conduct the sound through the chest and it is heard as a soft musical chiming, resembling the sound of a distant bell or the ring of a hammer on an anvil.

An outline of the air-containing space can be made, inasmuch as this sound is not elicited over lung tissue.

Auscultation.—Sounds are created by the act of breathing both in inspiration and expiration, and differ in character according to the location.

The lungs are auscultated to determine whether the breath sounds are characteristic of the situations in which they are found, and if such sounds are produced in health or are the result of a pathological process as indicated by new or adventitious sounds, and also to determine the character of the voice sounds or vocal resonance.

The value of auscultation lies in the ability of the examiner to isolate particular sounds or in his cleverness to eliminate all sounds but those he desires to

hear; in other words, he must not permit the multiplicity of sounds heard during an examination of the chest to obscure those he should hear and thus defeat his purpose.

This may be overcome by training, a concentration of mind, and the aptness with which a discrimination of the lung sounds and the heart sounds can be made. It is comparatively easy after the training of this special power of mind has been accomplished.

TECHNIC OF AUSCULTATION.—The applicant should assume the standing or sitting position, and in order that the full value of this means of diagnosis may be attained the same precautions are taken as in palpation and percussion.

The attitude must be easy, symmetrical and free from restraint. Care must be exercised to see that the same freedom of movements are permitted for both sides of the chest.

The chest must be bared or covered with a thin shirt or a soft towel free from starch.

During auscultation of the anterior part of the chest, the arms should hang loosely at the sides. When practiced on the posterior part, the applicant should lean forward and place his hands on opposite shoulders, thus widening the inter-scapular region.

METHODS.—Two methods of auscultation are practiced: The direct and the indirect, the choice depending to a large extent on the examiner, although satisfactory results are obtained from both.

In the direct method the ear is applied directly to the chest. Some auscultators prefer this method and are

able to detect certain adventitious sounds with rare skill, probably the result of training.

In the indirect method a stethoscope or phonendoscope is used. The advantages claimed for this method are the accuracy with which sounds are discriminated, and their location noted, and the differentiation of sounds originating from contiguous sources.

The best auscultators are accomplished in both methods and are therefore able to meet crucial tests in cases where uncertainty exists.

RESPIRATORY SOUNDS.—Attention must be directed particularly to the character of inspiration, the character of expiration and the relative interval; a knowledge of the rhythm of the respiratory movements is essential—in health they are almost equal in length. The inspiratory sound, however, is heard during the entire act of inspiration, while the expiratory sound is heard during less than one half of the expiratory act.

It is also absolutely necessary to examine both lungs thoroughly to determine whether or not the sounds are symmetrical in corresponding areas; occasionally slight variations are found, which are not associated with pathological changes, but which are the result of a temporary condition, and are often unimportant.

NORMAL BREATH SOUNDS.—Two sounds are recognized as normal when heard over certain areas of the chest, viz.: bronchial breathing and vesicular breathing.

BRONCHIAL BREATHING.—The stethoscope being placed over the trachea, an inspiratory and an expiratory sound are heard, separated by a distinct interval, These sounds are almost equal in length. If any difference exists, the expiratory sound is the longer.

These sounds are known as bronchial or tubular breathing, and are caused by the passage of air through the nares into the trachea and lesser bronchial tubes.

The sound produced by slow expiration with the mouth and tongue in position to pronounce " ch " is a correct imitation of this sound.

Bronchial breathing is normally heard over the trachea as far down as the supra-sternal notch, and posteriorly in the inter-scapular spaces as low as the sixth and seventh cervical vertebræ.

VESICULAR BREATHING.—If the ear be placed over healthy lung tissue a distance away from the trachea and large bronchial tube, sounds of a soft, breezy or sighing character are heard during both inspiration and expiration.

These sounds differ from the bronchial breathing in that the relative length of the inspiration and the expiration is changed, the former being heard during the entire inspiratory act, and the latter during the first third or half of the expiratory act.

The production of this murmur is caused by the expansion and contraction of the air cells and finest bronchial tubes, together with the transmission of the sounds of the trachea and tubes modified by their passage through the lung tissue.

This sound is imitated by placing the teeth and lips in position to pronounce " f " and breathing slowly.

MODIFICATIONS OF NORMAL BREATH SOUNDS.—Modifications of these sounds are heard normally over certain areas. The two sounds are more or less blended, partaking of the qualities of each, and are known as broncho-vesicular breathing.

This sound is soft and blowing in character and is caused by a lessened modification or a tempering of the bronchial breathing, due to the bronchus being surrounded by fewer air cells.

It is heard over the lower portion of the manubrium, over portions of the chest where the larger bronchi are, and in the inter-scapular region over the lower cervical and upper dorsal vertebræ.

Breath Sounds in Disease.—It must be remembered that any alterations or modifications of the sounds normally heard in certain areas are recognized departures and due to some pathological process. These may appear as alterations of character, rhythm or intensity.

Bronchial Breathing Replacing the Vesicular Murmur.—This may be due to consolidation of lung tissue, a large cavity communicating freely with a bronchus, compression of lung tissue from effusions or tumors by reason of the occlusion of the vesicles or bronchioles; in these cases bronchial breathing is present but not heard, a fact to be remembered.

This type of breathing is heard in all pathological processes where consolidation of lung tissue is present. The conductivity of this solid tissue being great, the sound is transmitted to the ear.

Bronchial breathing is not clear and distinct in every instance, therefore the special characteristics that mark this type must be borne in mind. The preponderance of these decides the type.

The varieties of bronchial respiration in diseased conditions are due to alterations in pitch and quality.

If the sound is transmitted from a cavity or a large

bronchus by consolidation it is low pitched and may have the qualities known as cavernous or amorphic.

If it is transmitted from a consolidation around the medium and smaller tubes, it is high pitched and whiffing in character, and known as tubular breathing.

CAVERNOUS BREATHING.—This is heard in inspiration and expiration, is low in pitch and has a hollow quality, from which it derives its name, and due to an empty, or partially filled cavity.

AMPHORIC BREATHING.—This is cavernous breathing, having an added musical or metallic quality.

The sound resembling this is produced by blowing partly across and partly into an empty bottle.

It is due either to a cavity with firm thin walls communicating with a bronchus or an open pneumothorax.

The fact that bronchial breathing is heard over an area and rather suddenly disappears, or is not heard over areas where it should be, is due, in many instances, to an occlusion by mucus of the bronchus leading to the consolidation. The tracheal sound is thus prevented from transmission to the ear. Later this interference is dislodged and the correctness of this assumption is made manifest.

Cavernous or amphoric breathing may be entirely destroyed by the filling of the cavity. A return of these sounds will be heard when the cavity is empty.

BRONCHO-VESICULAR BREATHING.—When this type of breathing is heard in areas other than where normally found, it denotes that the same changes are taking place, as later, when complete changes have occurred, it is manifested by bronchial breathing. It is rather a transitional stage in the development of the

latter type. It may be indicative of a lesser degree of consolidation or a small collapsed portion of lung tissue.

If this sound is heard in the apex of one lung (particularly the left), is constant and is accompanied by prolonged expiration, it is significant of early tuberculosis.

Changes of Rhythm.—The changes or alterations in rhythm, of special importance to the examiner by reason of their clinical value, are prolonged expiration and jerking or interrupted inspiration.

Prolonged Expiration.—In prolonged expiration, the expiratory sound may equal or exceed in length the inspiratory sound.

It is caused by an obstruction in the bronchi or bronchioles or an inelasticity of the air-cells, which prevents the easy egress of air from the lungs.

If this is heard over the entire chest, is low pitched and soft in character, it denotes a relaxed or distended condition of the lung tissue and is observed in emphysema and asthma.

If the prolonged expiratory note is high pitched and located over the apices of the lungs (particularly the left) it is recognized as one of the earliest physical signs of tuberculosis. If found over the right apex its importance is not so great, and other confirmatory symptoms must be present. Because of the normal difference of breathing on this side it is usual to find an intensified vesicular respiration in this region.

Jerking or Interrupted Inspiration.—In this form the jerky or interrupted sound is limited to the inspiratory element. Instead of the smooth, even and easy inspiration the vesicular element is broken up, and at the end

of inspiration it has a number of similar sounds or puffs.

This is caused by the air being forced into the lobules in an irregularly successive manner.

This is found in early tuberculosis, the small bronchioles being occluded by tubercles or swollen because of the irritation of their presence.

Jerky inspiration, however, is present in health in nervous individuals and is heard in the region of the heart during tumultuous or excited action. In this instance it is due to pressure, the air entering the lobules at different periods of time, or as the pressure is removed from each series of lobules.

It must not be forgotten that prolonged expiration is present when jerking inspiration is due to a morbid process.

Alterations in Intensity.—Puerile breathing is an intensification of all the qualities of vesicular breathing. The sounds are louder and sharper and are often mistaken for broncho-vesicular breathing, to which it is similar, but the normal ratio between the length of inspiration and expiration is maintained, notwithstanding its increase in intensity.

This type is heard in children normally and in adults in the region of the right apex it is approached. In adults it is somewhat similar, and over the entire chest in vigorous respiratory movements.

If it is confined to one lung it usually denotes a compensatory condition as a result of diseases of the opposite lung.

Locally an increase in intensity is one of the early signs of phthisis.

A comparison of corresponding areas must always be made.

Diminished or Absent Vesicular Breathing.—The murmur of vesicular breathing is lessened in old persons and those who are feeble.

It is weak in emphysema on account of the continued distension of the air cells, which prevents a large amount of air from entering.

Thick chest walls, whether from a large quantity of fat on the outside or thickened pleura on the inside, will cause diminished intensity. The latter condition occurs unilaterally in the vast majority of instances.

The occlusion, either complete or partial, of a bronchus, such as pressure of an aneurism or mediastinal tumor, of mucus or a foreign body, will cause a weakened sound or the absence of this sound.

The early stages of tuberculosis cause a diminution of intensity.

Auscultation of the Voice.—The vibrations produced by speaking are transmitted through the air columns in the trachea and bronchial tubes and through the substance of the lung tissue to the ear applied to the chest wall. These vibrations or sounds are known as vocal resonance.

VOCAL RESONANCE.—It is produced by the same causes, influenced and modified by the same conditions and circumstances, as are the sounds that are appreciated by the tactile sense or vocal fremitus.

In vocal resonance the spoken words are not recognized, but the sounds conducted to the ear, and known as the normal vocal resonance, are of a buzzing character.

The areas over which this sound is heard with the greatest distinctness is the right apex. It is more marked in persons with a strong, low pitched voice, and those having a thin chest wall.

INCREASED VOCAL RESONANCE.—This is caused by consolidation of lung tissue and cavities.

DIMINISHED VOCAL RESONANCE.—This resonance may be weak or absent according to the diminution of the air supply, due to such causes as pleural effusions, emphysema, occlusion of the bronchus, either externally or internally, or thickened pleura.

BRONCHOPHONY.—Bronchophony is the term used for the sound transmitted to the ear when the voice is comparatively distinct in character.

It is heard normally over the manubrium in a healthy chest.

All abnormal conditions which produce bronchial breathing will cause bronchophony, provided that the bronchus is not occluded. When it is heard over areas where the vesicular murmur is present in health, it denotes a consolidation.

PECTORILOQUY.—This is the normal tracheal voice With the stethoscope placed over the trachea the sound transmitted to the ear is distinct; the spoken words can be distinguished and understood.

Pectoriloquy is heard over consolidations connected with a large bronchus, a freely communicating cavity and an open pneumothorax.

If the individual whispers instead of speaking aloud the voice is transmitted with remarkable clearness and is known as whispering pectoriloquy.

EGOPHONY.—This is a modification of the voice

sound. It is tremulous or bleating in character, and resembles the bleating of a goat.

It is heard in the upper limits of pleural effusions and in the region of the scapular angle in moderate effusions.

The explanation offered is that the fundamental tones are intercepted by the fluid, the overtones passing through give the peculiar sound.

New or Adventitious Sounds.—When sounds are perceived in the lungs, which are new and are not created by the normal breath sounds, they are known as rales. They are divided into two groups, Dry Rales and Moist Rales.

DRY RALES OR RHONCHI.—These rales are the whistling or musical sounds produced by the air passing through the narrowed or reduced lumen of the bronchial tubes.

The dry rales are divided into two groups, the sibilant and sonorous rales.

The sibilant rales are high pitched and whistling in character, are heard near the end of the inspiration, and have their origin in the smaller bronchial tubes.

The sonorous rales are low pitched and musical in character, are heard during inspiration and expiration, and have their origin in the larger bronchial tubes. It must be remembered that the pitch and intensity will vary with the size of the tube, and that these rales co-exist and may be heard at the same time.

Dry rales are heard in the early stages of bronchitis because the lumen is narrowed by swelling, in asthma because of a reduction from spasm, and in chronic bronchitis and emphysema.

MOIST RALES.—Moist rales occur in any and all parts of the bronchial tract from the beginning of the trachea to the utmost ramifications of the bronchial tree.

These rales are produced by the passage of air through fluid, no matter of what nature, and the forced expansion of terminal air vesicles.

These rales are divided into (1) Crepitant rales, (2) Sub-crepitant or fine moist rales, (3) Large moist or mucous rales.

THE CREPITANT RALES.—These are the finest of all rales and are caused by the forced expansion of the terminal air vesicles or a separation of their walls, which were adherent from exudation of lymph.

These rales are heard at the end of inspiration, and may be imitated by rolling a lock of hair between the fingers.

They are heard in beginning pneumonia, œdema of the lungs and incipient tuberculosis.

Sometimes crepitant rales are heard in the apex or at the base of the lungs during the first few deep inspirations in those unaccustomed to deep breathing. They disappear and are not significant.

SUB-CREPITANT OR FINE MOIST RALES.—These rales are intermediate in size and are created in the small tubes.

They are heard during inspiration and expiration and denote the presence of fluid, which imparts a bubbling sound.

These rales are heard in the second stage of bronchitis, beginning infiltrations and the softening of tissue in consolidation.

When heard at the apex they are strongly indicative

A peculiar intermediate crackle or click is heard in the apex at times, when the secretion is viscid. Usually it can be attributed to tuberculosis.

LARGE MOIST OR MUCOUS RALES.—These are the largest rales and occur in the largest tubes or cavities and are produced by the same causes as the subcrepitant rales.

These gurgling or bubbling rales are heard chiefly in the later or softening stages of phthisis, the passage of air through the cavities containing fluid, deep breathing or coughing facilitating their expression.

Metallic Tinkling.—This is heard in hydropneumothorax and sometimes in a cavity with hard smooth walls.

This sound is of a musical or tinkling character and denotes the dropping of fluid into a partially filled space, the walls acting as a resonator and producing the echo.

Succussion Sound.—The splashing sound is heard in hydropneumothorax and pyopneumothorax and sometimes in a partially filled cavity. To elicit this sound the ear is applied to the chest. When the individual's body is then suddenly moved, the swash of the fluid is heard.

Friction Sound.— This sound is produced by the rubbing of inflamed pleural surfaces together.

It is distinguished by its rhythm, corresponding to that of respiration and is audible during both inspiration and expiration. It remains localized and is not disturbed by deep breathing or coughing. It is superficial and usually over the seat of pain. Pericarditis and acute pleurisy are its usual causes.

CHAPTER VII

PHYSICAL EXAMINATION OF THE CHEST (Cont'd.) THE HEART

Introduction.—The essential requisite to a correct diagnosis and an intelligent interpretation of the characteristic signs educed by diagnostic technic is an absolutely accurate and comprehensive knowledge of the normal condition.

It is not only necessary that the exact anatomical position of the heart be known, but also certain areas be located, when percussion and auscultation are practiced. The purpose of outlining the heart with greater precision and of hearing the sounds with greater facility is thus the better subserved.

The Topographical Anatomy of the Heart.—The relations of the heart or its outlines to the chest wall will be appreciated by a careful study of the following points:

(1) The base or upper border is the line dividing the heart and its attachments to the great vessels, and corresponds to a line drawn horizontally across the sternum on a level with the upper border of the third costal cartilage. This line should extend one-half inch beyond the right edge of the sternum and one inch beyond the left edge.

(2) The lower border, a point two inches below the nipple in the mammillary line and one inch within this line, locates the apex beat. Locate another point

at the junction of the upper and middle thirds of the xiphoid cartilage, then draw a line curving slightly downward from the point denoting the apex to this point, and the lower border is defined.

(3) The right border is defined by drawing a line beginning at the right end of the base, curving to the right about one and one-half inches from the right edge of the sternum, until it reaches the fourth interspace, then curving to the left to join the right end of the lower border line.

(4) The left border is defined by drawing a line, beginning at the left end of the base, curving to the left as far as the nipple (not including it) and joining the point denoting the apex beat.

The Percussion Areas.—Two percussion areas are recognized, the superficial or absolute dulness and the deep or relative dulness.

The superficial cardiac dulness is of a triangular shape. It is bounded by a line drawn along the left edge of the sternum from the upper border of the fourth rib to the upper border of the sixth rib. The triangle is completed by projecting two lines from these points, meeting in the fifth interspace midway between the mammillary and parasternal lines, this point forming the apex of the triangle and being slightly within the apex beat.

The deep or relative dulness denotes the entire dulness of the heart and is of greater interest from a diagnostic point than superficial dulness.

The amount of relative dulness will depend on the skill and acuteness of hearing of the examiner and his ability to differentiate fine distinctions in sound.

To determine relative dulness, begin by percussing far enough away from the heart to elicit pulmonary resonance and proceed toward the heart from either side, commencing in the interspaces above the heart and percuss horizontally. When the first alteration in pitch is noticed, mark the point; continue in this manner until the entire relative dulness is mapped out on the chest wall.

The Auscultation Areas.—These areas do not represent the location of the valves, but are points nearest to the surface of the chest to which the sounds are conducted, and are therefore more isolated and heard loudest.

(1) The Mitral area. At the apex.
(2) The Tricuspid area. At the lower portion of the sternum.
(3) The Aortic area. At the second interspace at the right of the sternum.
(4) The Pulmonary area. At the second interspace to the left of the sternum.

The Cardiac Cycle.—The cardiac cycle is the term used to denote one complete revolution of heart action.

The revolution comprises two events; the first is the contraction of systole, and the second is the dilatation or diastole.

Taken together, therefore, the entire accomplishment of systole and diastole represents one revolution or cycle.

The necessity of a clear understanding of the changes taking place in the heart during a cycle is apparent; hence the fundamental facts must be indelibly impressed on your mind.

During systole the ventricles contract, the auriculo-

ventricular valves close and the blood is propelled through the arteries.

During diastole the aortic and pulmonary valves close, the auricles are filled with blood and the contraction of their walls forces the blood into the ventricles.

The periods of systole and diastole are nearly of equal length in time, the former being synchronous with the apex beat of the heart.

During a rapid action of the heart, it will be noted that the diastolic period is shortened, rather than the systolic.

Inspection.—The applicant must be stripped of all clothing as far as the waist, and a careful inspection made with direct and oblique illumination under a good light, which affords every opportunity for detecting any abnormality.

The region directly overlying the heart or the præcordia, as it is known, should be studied with reference to its prominence, depression and pulsations.

A bulging may be due to a local deformity of the chest. A prominence is manifested in later life as a result of an hypertrophy of the heart in childhood. Mediastinal tumors or an aneurism in this region will cause præcordial bulging.

A retraction or a sunken condition occurs as a result of a past pericarditis or past emphysema.

The Apex Beat.—In a healthy man the apex beat is located in the fifth interspace, about one-half inch inside the mid-clavicular line, and is limited to a space about one inch in diameter.

This space is elevated about one-fourth to one-half

inch during each impulse. It is not made by the true apex, but by a portion of the ventricle striking against the chest wall.

The impulse represented by the apex beat and the ventricular element, Musser believes, can be more conveniently studied as the cardiac impulse, because the same influences which alter the apex beat will also alter the impulse or diffuse the heart beat.

In the majority of cases no difficulty is experienced in seeing the impulses, even in those having thick chest walls. With the light properly adjusted the difficulty is slight.

The impulse is feeble or imperceptible in women with large mammary glands, in men having a large amount of subcutaneous fat on the chest, or when the muscular development is extreme, or in case the heart strikes behind a rib.

The important feature of accurately locating the apex beat is recognized because it is a guide with reference to the location of the heart, and, being systolic in time, it furnishes information as a criterion in regard to other pulsations and their relation to the action of the heart. We can determine whether or not they are presystolic, systolic, or diastolic.

In health the apex beat is not a fixed point, but changes with the position of the body, moving to the left when the body reclines on the left side more than one inch. During full inspiration it moves downward and to the right. It is most distinctly seen in those who are thin, when the body is inclined forward and during full expiration.

DISPLACEMENT OF THE APEX BEAT.—Eliminating

all the normal changes due to decubitus and respiration, other changes are perceived which are attributable to disease.

A displacement to the left, either upward or downward, may be due to conditions extraneous to the heart; a compensatory emphysema of the right lung pushes the heart toward the left, and a retraction of the left lung on account of pleuritic adhesions to the pericardium, phthisis, or cicatrices in the lung from any cause, aortic aneurism, mediastinal tumors or enlarged glands, will cause this displacement.

The abdominal conditions causing displacement are: dilatation of the stomach (either temporary from flatulence or permanent from organic disease), abdominal distension (tympanitic, ascitic, or new growths) enlargement of the liver and spleen.

The diseases of the heart most frequently causing displacement to the left are dilatation and hypertrophy.

Displacement of the cardiac impulse to the right is not found in any diseases relating immediately to the heart or pericardium, but is confined to those diseases causing contraction of the right lung or an emphysema of the left lung on account of a crippled condition of the right lung, a tumor of the left lung crowding the heart toward the right side.

In these cases, while the apex beat is displaced, the impulse perceived is the result of an hypertrophy of the right auricle, or ventricle, or both, due to the increased resistance offered by the lung changes.

Extent and Character of Cardiac Impulse.—In health the impulse is limited to a space about one inch in diameter.

This may be increased in those who have a very thin chest wall, as the result of nervousness, excitement or physical exertion.

Under these circumstances the apex beat is not displaced; it is simply increased in strength. This is an important point and is of clinical value.

In mediastinal diseases and aneurism of the aorta, the heart is in closer contact with the chest wall and creates an impulse extending perhaps over several interspaces. In these instances the impulse seems to partake of the entire action of the heart and appears as an undulating or cardiac wave.

The diseases of the heart causing an increase in the area of the impulse are dilatation, hypertrophy and pericardial adhesions.

In these diseases the displacement or changed position of the impulse will assist the examiner in locating the cause or lesion.

In hypertrophy the impulse is heaving in character, systolic in time. It may include the lower part of the sternum and extend beyond the mammillary line, occupying from two to four interspaces.

A decrease in the cardiac impulse may be observed in health. A large amount of subcutaneous fat or the apex striking behind a rib will either weaken or render the impulse absent.

The disease responsible for an enfeebled or extinct impulse is an emphysema or a compensatory emphysema of the left lung. The intervention of lung tissue between the heart and the chest wall prevents the impulse from reaching the surface.

The mobility of the heart is restrained in mediastinal

and pericardial adhesions. Therefore, instead of an impulse, a systolic drawing or retraction of the præcordial region is seen and possesses diagnostic value according to Butler; this may be supplemented by observing Broadbent's sign, which is, on inspection behind, a systolic retraction of the region of the eleventh and twelfth interspaces in pericardial adhesions.

The impulse is absent or weakened in atrophy, myocarditis, dilatation, and fatty degeneration.

New Pulsations.—Pulsations are observed in the præcordial region, which are new and not caused by the apex beat.

When this condition occurs, the origin is usually found to be disease of the blood vessels or an hypertrophy of one of the auricles or ventricles; if a new pulsation is seen in the second or third intercostal spaces on the left of the sternum it may be caused by pulsation of the pulmonary artery, an enlargement or more forcible contraction of the left auricle in mitral stenosis; it may be due to an enlargement of the right side of the heart or an aneurism of the aorta.

It may be generally stated that all pulsations above the third rib are due to diseases of the blood vessels, and below this rib to diseases of the heart; likewise pulsations on the right side of the sternum are caused by diseases of the vessels, and on the left side to diseases of the heart.

Pulsations Not Restricted to the Præcordia.—Pulsations not limited to the regions of the heart may very properly be considered here, because of the intimate association of the arterial system with the heart.

Pulsations occurring elsewhere should be studied with reference to the time and rhythm of the apex beat.

It may be said that aside from carotid pulsations, visible pulsations of other arteries do not occur in health.

Arteries of the Neck.—As has been said, pulsation of the carotid arteries can be seen in health; this may be increased under excitement and may be regarded as temporary but when it is visible to an abnormal degree and persistent it suggests lesions of a serious nature.

It is one of the manifestations of exophthalmic goiter. It is seen in a marked degree in anæmia and is characteristic of atheromatous degeneration in the vessels due to advancing years; it is present in aneurism; it occurs in cardiac hypertrophy and aortic regurgitation. In the latter disease the carotid pulsation exhibits a peculiar significance in that it resembles the pulsations due to aneurism. It is large in volume, jerky, the artery swells and quickly collapses.

Pulsations in the Episternal Notch.—Pulsations here are seen in health, especially in older persons. Sometimes they are due to a neurosis or anæmia, but when marked they are usually caused by aneurism.

Epigastric Pulsation.—If the pulsation is post-systolic the abdominal aorta will transmit an impulse that can be seen in those who have thin abdominal walls, even when the artery is free from disease, if care is exercised and the light properly adjusted; it may also be seen in those suffering from temporary gastric disturbances and individuals possessing a nervous temperament.

Pulsations may be transmitted from the aorta because of the presence of tumors of the stomach, enlargement of the pancreas, enlargement of the lymph glands.

In all cases, in order that we may assure ourselves that the impulse is a transmitted one, a well defined tumor must be mapped out, a peculiar heaving or lifting sensation must be imparted to the hand, and with the person in the knee-chest position the pulsations must be extremely weak or disappear, because by its weight the tumor is carried away from the artery.

Aneurism of the abdominal aorta is one of the causes of epigastric pulsation. A positive diagnosis cannot be rendered unless other physical signs are present.

The presence of a palpable tumor having a distinct expansile character, palpable epigastric thrill, accentuation of the aortic second sound, high arterial tension and an aneurysmal murmur are the associated symptoms upon which the examiner must depend.

If systolic in time epigastric pulsation may be due to an hypertrophy of the right ventricle, or it may be a transmission of the impulse of an overacting or hypertrophied heart to the left lobe of the liver.

Pulsation of the Liver.—When the entire liver pulsates it may be seen or palpated by placing the hands firmly over the liver when the whole organ is felt to expand just following systole. This pulsation is pathognomonic of tricuspid insufficiency.

Inspection of the Smaller Arteries.—The radial, temporal, femoral, and popliteal arteries can often be seen in the vascular change known as arterio-sclerosis. They are hard, tortuous, dilated, and pulsating.

Palpation of these arteries confirms inspection, and in addition imparts a "beaded" sensation if calcareous degeneration has taken place.

Pulsation alone in the smaller arteries may be due to left ventricular hypertrophy or aortic insufficiency; however, the nearer the heart is approached, the more prominent and pronounced the pulsation.

Inspection of the Veins.—A general venous enlargement is due to those diseases which impede the flow of the blood toward the heart, or lesions of the lungs causing interference with the blood pressure.

The former is usually due to dilatation or tricuspid insufficiency, the latter to emphysema or asthma.

A localized venous engorgement is the result of any condition impeding the free flow of blood through any particular venous trunk; it may be from pressure or thrombosis, as the result of an inflammatory condition of the vein, or pregnancy.

Pulsation in the veins can be seen normally only in the external jugulars, and is known as the pre-systolic or true venous pulse. It is timed by the apex beat and caused by the contraction of the auricle, which produces a back-wave in the vein.

The systolic venous pulsation is pathological, and caused by tricuspid insufficiency, the back wave being transmitted to the jugular bulb—if the valve is incompetent the wave extends further upward.

This same wave is transmitted to the veins of the liver, causing pulsation of the liver, which is synchronous with the action of the heart.

Palpation of the Heart.—In addition to the verification of the results of inspection, palpation enables us

to study the strength or force of the cardiac impulse and the detection of thrills and friction fremitus.

The impulse is increased in a strong or overacting heart, and pericardial adhesions. In dilatation the impulse may impart a wavy sensation to the palpating hand.

The most marked increase is felt in cardiac hypertrophy. Sometimes the whole lower part of the chest partakes of a systolic heaving or lifting due to the enormous enlargement seen in aortic obstruction or insufficiency.

The impulse is diminished in strength in a weak heart and degenerative changes.

Thrills.—The production of a thrill is the result of vibration caused by the blood passing over a roughened surface.

It is necessary when a thrill has been determined to exist, to ascertain its points of greatest intensity and its relation to the time of the apex beat.

The points at which thrills are most frequently detected are:

(1) *The Apex.* If the thrill is presystolic or diastolic in time it is caused by mitral stenosis; if systolic it is caused by mitral incompetency.

(2) The right second intercostal space. The thrill is due to aortic stenosis if systolic, and aortic incompetency if diastolic in time.

Thrills are described as rough, hesitating vibrations, transmitted to the palpating hand.

It is necessary that extreme care be exercised in differentiating these thrills from those due to aneurism of the præcordial region.

Friction Fremitus.—Friction fremitus is characterized by its to and fro sensation. It is caused by the rubbing together of inflamed surfaces and found in the first stage of pericarditis.

In all cases the condition of the person may cause the thrills or friction fremitus to become increased, diminished, or disappear.

They are more intense in the upright, and lessened as the individual assumes the recumbent posture.

Percussion of the Heart.—The size, shape, and location of the heart are determined by percussion.

The choice of one of three methods is open to the examiner:

(1) Using the fingers as a plexímeter and plessor.
(2) Auscultatory percussion.
(3) The method of Sansom.

The first method has been described under Percussion Area of the Heart.

Auscultatory percussion is practiced by placing the receiver of a binaural stethoscope over the heart and percussing with the fingers, as in the ordinary method, care being taken to begin beyond the presumable area over which dulness is supposed to exist and approach the bell of the stethoscope from all points, marking with an aniline pencil the point where alteration in sound is first noticed, which is an increase in intensity, higher pitch and of different quality.

The method of Sansom consists in the use of a special plexímeter of his own design. It is made of vulcanite and consists of two plates joined by a rod one and one-half inches long. The lower plate is one inch by

one-half inch, the upper plate three eighths by three fourths of an inch.

The larger or lower plate is applied to the surface of the chest with its long diameter parallel to the sternum and held in place by the tips of the first and second fingers of the left hand, one on either side of the rod. Percussion is made on the smaller or upper plate with the middle finger of the right hand in the usual manner. The vibrations produced are appreciated by both the ear and the tactile sense.

Begin by percussing about two or three inches to the right of the sternum on the level of the fourth rib and continue toward the left when a modification of the vibrations is perceived, incline the pleximeter toward the left so that the sound emanates only from the edge. This line indicates the right cardiac border and a mark should be made.

Proceed in this manner, above and below this level, until the right border is defined.

Similarly the left border is defined by percussion on the left side.

Percussion should extend on either side from the first to the fifth interspace.

On the right side the line of demarcation between the heart and the liver is difficult to determine, but it is usually in the fifth interspace.

In defining the apex, on account of the small area, the pleximeter may be reversed, the smaller plate being used.

The special advantages claimed by Sansom in reference to the correct determination of certain facts are as follows:

" A projection to the right of the area of the upper part over the second and third interspaces points to aneurism of the aorta or of the innominate artery.

" It may be traced to the left side of the sternum on account of the saccular dilatation of the aorta.

" If the dulness at the upper part extend greatly to the left, an increase in size of the pulmonary artery may be suspected.

" Along the mid-sternal region, extension beyond the right side joining the line indicating the upper border of the liver, indicates distended inferior cava.

" This distension occurs in right-sided dilatation of the heart, and the dulness may also be due to dilatation of the adjoining auricle.

" The outline of dulness obtained over the apex of the heart, if pointed, indicates hypertrophy; a more rounded outline shows dilatation.

" In uncomplicated hypertrophy the line of the right ventricle forms a much less obtuse angle with the liver-dulness than in dilatation.

" Of great diagnostic value is the diminution of the area of dulness from atrophy of the heart as observed in wasting, as in cancer and in tuberculosis; it may also be observed in typhoid fever.

" In the above mentioned conditions it is a bad prognostic sign."

Auscultation of the Heart.—The direct or indirect method may be practiced; the former enables the examiner to form a generally clear conception of the heart sounds; the latter has the advantage in that the individual sounds can be better isolated and studied.

Auscultation permits of the determination of the following points:

(1) The normal sounds and their special characters.
(2) Alterations of the normal sounds.
(3) The presence of murmurs or abnormal sounds.

The Normal Heart Sounds.—Auscultation over the præcordial region reveals two separate and distinct sounds during each cardiac revolution or cycle.

They are distinguished from each other by their time, character, and normal accentuation.

The first or systolic sound occurs at the beginning of the ventricular contraction and corresponds in time to the cardiac impulse. This sound is muscular and valvular, and is followed by a short silence. Then the second or diastolic sound is heard, which is strictly valvular, and is followed by a long silence, continuing until the first sound is again produced.

The character of the two sounds is widely different; the systolic sound is dull, prolonged, low pitched and resembles the syllable "lubb"; the diastolic sound is sharp, shorter, higher pitched, and resembles the syllable "dupp."

Together they resemble the sound produced by pronouncing the syllables "lubb-dupp," "lubb-dupp."

The normal accentuation of the systolic sound is at the apex and of the second sound at the second interspaces on the right or left of the sternum.

It must be remembered that an analysis of each sound will show that it is composed of two parts, making in all four separate sounds, corresponding to the four different valves.

The audibility of these respective sounds, their isolation and differentiation are accomplished with a greater degree of facility by auscultation of the areas towards which the sounds are transmitted. Of the systolic

sounds, the mitral sound is heard with the greatest degree of clearness and loudness at the apex; the tricuspid at the lower part of the sternum.

Of the diastolic sounds the aortic second sound is heard loudest at the second interspace on the right of the sternum, and the pulmonary second sound at the second interspace on the left of the sternum.

ALTERATION OF THE NORMAL SOUNDS.—Both sounds may be *increased* in loudness or accentuated. This is often the result of physical exertion or mental excitement. Again it may result from constitutional troubles, as anæmia; a consolidation of lung tissue, on account of its greater conductivity; a shrinking of the lung from any cause, permitting the heart to approach nearer to the chest wall; a forcing of the heart nearer to the chest wall by mediastinal tumors; hypertrophy of the heart will cause accentuation of both sounds, since by reason of its strong muscular action greater force is exerted on the valves; gaseous distension of the stomach or intestines; one of the heart neuroses or an abnormally thin chest wall may be regarded as producing increased intensity of the heart sounds.

Both sounds may be *diminished* in intensity. This may result from an abnormally thick chest wall or diseases interfering with the clearness of the sounds by the interposition of a body which dulls the sounds, as emphysema, pericardial or pleural effusions.

The conditions of the heart causing a weakening of the sounds are to be found in atrophy, degenerative changes in the heart muscle (myocarditis), dilatation and exhaustive diseases.

ALTERATIONS OF INDIVIDUAL SOUNDS.—Alterations of the normal sounds as a whole have been considered. Now alterations of the individual sounds will be studied.

ACCENTUATION OF THE FIRST SOUND.—This is said to exist, when it is heard more distinctly at the base of the heart than the second sound, when it is louder or duller, more prolonged than normal at the apex, and denotes an hypertrophy of the left ventricle.

In hypertrophy of the right ventricle the sound partakes of the same qualities, but to a lesser degree.

If the systolic sounds are sharp, short, higher pitched, have a distinct valvular quality and resemble the diastolic sounds, eliminating the muscular element entirely, it is due to a moderate degree of dilatation, the accentuation decreasing as the dilatation becomes greater, finally disappearing.

The diminution of the systolic sound is observed in those diseases which cause a weakness of both sounds, the muscular element being represented largely in this sound. It is true, then, that those diseases in which the heart muscle is weakened will contribute their share towards weakening of the systolic sound; atrophy, dilatation, and myocarditis stand pre-eminently at the head.

The strength of the heart is estimated by the character of the first sound; as this sound approaches a strictly valvular sound, at the same time the muscular component becoming less appreciable, it is regarded as the primary manifestation of cardiac weakness.

ACCENTUATION OF THE SECOND SOUND.—Accentu-

ation of this sound exists, when it is heard with greater distinctness at the apex than the first sound.

This sound being composed of two valvular sounds, the aortic and pulmonary, alterations in either may take place.

ACCENTUATION OF THE AORTIC SECOND SOUND.—It may be generally stated that any disease or condition which causes an increased resistance to the aortic circulation or heightens its tension, will cause an accentuation of this sound. From this it may be inferred that it does not necessarily always denote a disease of the heart in every case in which it is found, but may be considered as an index of the condition of the vascular system as a whole.

The diseases most commonly causing accentuation of this sound are chronic interstitial nephritis and arterio-sclerosis. On account of the resistance offered in the arterioles a back pressure in the larger arteries is exerted on the valves.

Hypertrophy of the heart, because of the great muscular action, will cause accentuation of this sound on account of the forcible distension of the aorta and the consequent effect on the valves, closing them with more force.

Aside from temporary causes, which increase arterial tension, when accentuation of the aortic second sound exists, it will be found to be associated with more or less hypertrophy.

A diminished aortic second sound is of serious consequence and denotes degenerative changes in the heart itself, or an atheromatous condition of the valves co-existing with the same process in the adjacent arteries.

ACCENTUATION OF THE PULMONARY SECOND SOUND.—This sound is accentuated in those conditions which heighten the tension of the pulmonary artery or interfere with the free circulation of the blood through the lungs.

The pulmonary second sound is said to be accentuated when it is equal to or exceeds in loudness the aortic second sound.

In acute congestion of the lungs, an accentuation is an evidence of the competency of the tricuspid valve; this sign is of special value from a prognostic point, inasmuch as it is a recognized physical sign of the integrity of the right ventricle, and the substitution of a weakened sound indicates the beginning of dilatation of the right ventricle or tricuspid insufficiency.

Emphysema, because of the interference with free pulmonary circulation, will cause accentuation of this sound.

Stenosis of the mitral orifice results in a retention of a larger amount of blood in the lungs, thus increasing the tension of the pulmonary artery. Insufficiency of the mitral valves also causes an abnormal quantity of blood in the lungs, causing back-pressure by intermingling with the blood received from the pulmonary artery, resulting in a heightened tension. This reflex of the blood column accentuates the pulmonary second sound.

REDUPLICATION OF THE HEART SOUNDS.—The stethoscope applied over the region of the heart will reveal the doubling or reduplication of the systolic or diastolic sounds in some instances.

The normal sounds are created synchronously in

health, *i.e.*, the mitral and tricuspid valves closing at the same time and the aortic and pulmonary valves at the same time.

In reduplication either the mitral and tricuspid or the aortic and pulmonary do not close simultaneously, but one will close after the other, an appreciable interval existing.

This phenomenon is not inconsistent with health. The asynchronous closure of either the ventricles or auricles is observed after exaggerated respiratory movements or results from unequal blood pressure in the lungs following exertion.

Viewed from a practical standpoint a reduplication of the first sound is heard in some cases of chronic interstitial nephritis and arterio-sclerosis, the blood pressure being elevated on account of the increased resistance offered in the systemic circulation.

A reduplication of the second sound is heard in some cases of mitral stenosis, cardiac dilatation, emphysema, and tuberculosis.

The disturbance of the blood pressure of the pulmonary circulation is responsible.

ADVENTITIOUS SOUNDS.—The normal heart sounds may be replaced in part or in whole by new or adventitious sounds.

These adventitious sounds are divided into two classes:

(1) Those originating from changes within the heart itself are termed endocardial or murmurs.

(2) Those originating from changes exterior to the heart are termed exocardial.

Murmurs are divided into two classes:

(1) Organic, which are caused by permanent physical changes in the valves.

(2) Hemic, which are caused by changes in the blood.

Exocardial sounds are caused by alterations in the pericardium or adjacent pleura.

The physical and mechanical causes entering into the production of murmurs are as follows:

Fluid passing through a vessel of nearly the same diameter throughout its course with continued and equal pressure, will not produce any sound. A constriction or pressure of sufficient amount to change its calibre, so that the fluid must pass through a narrow opening into a larger space, creates a murmur.

A fluid vein is formed by this process, the vibration of the atoms of which causes a murmur.

The intensity of the murmur depends to a large extent on the rapidity of the current.

Applying the same conditions to the heart, if one of the valvular openings is narrowed or the cavity dilated, the fluid passing into the larger space will be thrown into vibrations and a murmur produced. In this case the murmur is carried with the blood current, because the fluid vein runs in the same direction. This is known as an onward or obstructive murmur.

Again, if the valves are roughened or for any reason are not accurately coaptated, the blood is thrown backward from a wider into a narrower space, a murmur is then produced—in this case the murmur is carried against the blood current, the fluid vein running reversely to the blood stream. This is known as a backward or regurgitant murmur.

Murmurs, therefore, are caused by:

(1) Diseases of the valves, roughening, thickening, or deformities, causing a widening or narrowing of the orifices.
(2) Enlargement of the heart, causing a relative insufficiency.
(3) Diseases of the arteries.
(4) Conditions of the blood.

Organic Murmurs.—A clear conception of the differential points relating to the diagnostic value of heart murmurs cannot be fully appreciated unless the individual physiologic events constituting a cardiac cycle are carefully kept in mind.

During systole or first sound of the heart, the ventricles contract, the tricuspid and mitral valves close, the aortic and pulmonary valves are open and the blood is being propelled into the aorta and pulmonary artery.

The completion of contraction is followed immediately by the closure of the aortic and pulmonary valves, which is the beginning of the second sound or diastole.

During diastole, then, the aortic and pulmonary valves are closed, the blood passing through the open mitral and tricuspid orifices from the auricles into the ventricles, the auricles then contract, filling the ventricles, and immediately follows the next systole.

Green makes the following concise deductions: "Any organic valvular murmur that immediately follows, replaces or modifies the normal first sound (systolic murmur) must arise either from a leakage through the closed valves (mitral and tricuspid) or from an obstruction in those that should be freely open (aortic and pulmonary). Hence any organic endocardial systolic murmur must be due either to mitral

or tricuspid regurgitation or to aortic or pulmonary obstruction (stenosis.)."

"In diastole the opposite conditions prevail; the mitral and tricuspid valves being open and the aortic and pulmonary valves closed, it must follow that conversely any murmur immediately following, modifying or replacing the second sound (diastolic) is due to aortic or pulmonary leakage or mitral or tricuspid obstruction."

"Nine out of ten murmurs have their origin in the left heart—the hard working side."

The presence of a murmur having been determined, the next feature to be considered is its correct interpretation.

The murmur may follow, be blended with or replace the normal heart sounds; therefore it becomes necessary to study the murmur in the same manner as the normal sounds, and its differentiation is accomplished by a careful study of its relation to the following points:

(1) The point at which it is heard loudest or at its maximum intensity.
(2) Time or rhythm.
(3) Area of diffusion and direction of its transmission.

(1) THE POINT AT WHICH AN ORGANIC MURMUR IS LOUDEST.—The recognition of the valve creating or producing the murmur is determined by noting the area of its maximum intensity or the point at which it is heard loudest.

This area usually corresponds to the area over which the valve producing the murmur is heard loudest in health.

tion with reference to the heart sounds, and their time is accurately determined by taking the carotid pulse (systole) with the finger while listening to the murmur with a stethoscope. A definite conclusion as to its proper place in the cardiac cycle is attained in this manner.

The time of the murmur is important also in determining the kind of murmur present, *i.e.*, a murmur created at a time when the valves normally should be closed denotes that the blood flows backward, and this is called a murmur of regurgitation; a murmur created at a time when normally the blood should be freely passing through an orifice, denotes that some obstruction exists, and is known as a murmur of obstruction.

It is necessary to differentiate and assign a murmur to one of these types with reference to the heart sounds.

(1) Systolic, (2) Diastolic, (3) Presystolic.

(1) A murmur simultaneous with ventricular contraction is known as a systolic murmur and corresponds in time with the first sound of the heart; it may accompany, follow or replace this sound, and ends before the second sound.

(2) A murmur synchronous with ventricular dilatation is known as a diastolic murmur. In this case the time of the murmur is the second sound of the heart. It may follow, modify or replace this sound.

(3) A murmur synchronous with auricular contraction is known as a presystolic murmur and in time corresponds to the long silence, occurring in any part of this silence, but preceding and ending with the beginning of the systole.

(3) AREA OF DIFFUSION AND DIRECTION OF TRANSMISSION—*Murmurs of the Mitral Area.*—The area of diffusion is limited to the apex or slightly within the apex in mitral stenosis; in mitral regurgitation the sound is propagated to the left and is heard over the left axillary space.

Murmurs of the Tricuspid Area.—Murmurs in this are not transmitted, but are heard over the right sternal border in cases where the sound is intense.

The area of audibility is relatively large, because of the dilatation or hypertrophy of the right ventricle, thus bringing it more to the surface.

Murmurs of the Aortic Area.—The area of diffusion is wide and usually extends over the entire præcordia in aortic regurgitation.

The aortic obstructive murmurs are transmitted into the aorta and carotids. They are heard with great distinctness here, and this is their distinguishing characteristic.

Murmurs at the Pulmonary Area.—These murmurs are not transmitted, they are limited to a small space and are distinct because the artery is superficial at this point.

Murmurs in this region are not propagated into the vessels of the neck, they are not heard over the region of the apex. Their strict limitation renders a differential diagnosis from mitral and aortic murmurs positive.

Individual Murmurs.—Individual murmurs will be considered under two heads:

(1) The Systolic murmurs: Mitral regurgitation, aortic obstruction, tricuspid regurgitation, pulmonary obstruction.

(2) The Diastolic murmurs: Mitral obstruction, aortic regurgitation, tricuspid obstruction, pulmonary regurgitation.

(1) THE SYSTOLIC MURMURS—*Mitral Regurgitation.*—Occurrence—Most common valvular defect.

Time—Systolic.

Maximum Intensity—At the apex.

Quality—Soft or musical.

Area of Diffusion—Transmitted widely over the præcordia and toward the left axillary space as far as the end of the scapula.

Cardiac Symptoms—First sound of the heart may be associated with, prolonged or replaced by the murmur. Pulmonary second sound accentuated. Enlargement of the right ventricle and apex displaced to the left.

Secondary Effects.—Mitral regurgitation throws the strain on the right heart, eventually dilatation ensues, resulting in venous engorgement; we then have cyanosis, palpitation, dyspenœa, œdema, with a small and feeble pulse.

Aortic Obstruction. — Occurrence — Not frequent, often combined with aortic incompetency. Usually it is found in old men with atheromatous changes in the arteries.

Time—Systolic.

Maximum Intensity—Aortic area.

Quality—Harsh, loud, and prolonged.

Area of Diffusion—Transmitted into the carotids, may be heard over the sternum and often over the entire chest.

A systolic thrill over the base of the heart is one of its distinguishing features.

Cardiac Symptoms—Hypertrophy of the left ventricle, apex displaced to the left and downward. Aortic first sound abolished, aortic second sound may be muffled, diminished or obliterated, pulse small and feeble.

Secondary Effects—If the heart dilates the murmur softens, dizziness is present on account of cerebral anæmia; other symptoms are those of aortic regurgitation, its most frequent associated lesion.

Tricuspid Regurgitation.—Occurrence—Rare.

Time—Systolic.

Maximum Intensity—Xiphoid cartilage.

Quality—Blowing, low in pitch and soft.

Area of Diffusion—Limited usually to the right and left of the lower sternum, but may be transmitted to the right axillary space.

Cardiac Symptoms—Right ventricle and auricle are enlarged with diminished accentuation of the pulmonary second sound and pulsating jugulars.

Secondary Effects—The same as mitral regurgitation to which lesion it is often secondary.

Pulmonary Obstruction.—Occurrence—Rare. Usually congenital.

Time—Systolic.

Maximum Intensity—Pulmonary area.

Quality—Harsh.

Area of Diffusion—Limited, not transmitted into the vessels of the neck.

Cardiac Symptoms—Hypertrophy of the right side of the heart, pulmonary second sound weak.

Secondary Effects.—Are those of associated congenital defects, patent foramen ovale or interven-

tricular openings, cyanosis, cough. Persons so affected do not usually reach maturity.

(2) THE DIASTOLIC MURMURS—*Mitral Obstruction.*—Occurrence—Fairly common, most frequently found in women.

Time—Presystolic, or it may occur at any time during diastole or fill any part of the diastolic period and terminates abruptly with the systole.

Quality—Rough with purring thrill.

Maximum Intensity—Just within the apex.

Area of Diffusion—Not transmitted.

Cardiac Symptoms—Hypertrophy of left auricle and right ventricle, first sound sharp, may be reduplicated, second pulmonary sound accentuated, pulse small.

Secondary Effects—The symptoms are those of mitral incompetency.

Aortic Regurgitation.—Occurrence—More common in later life and in men.

Time—Diastolic. Usually replaces the second sound.

Maximum Intensity—Second interspace on the right of the sternum.

Quality—Usually soft and long, but may be rasping.

Area of Diffusion—It is transmitted downward along the sternum on both sides towards the apex.

Cardiac Symptoms—Hypertrophy of the left ventricle.

Corrigan or water-hammer-pulse, first sound of the heart accentuated.

Associated Murmurs—Associated with aortic regurgitation, may be a systolic murmur at the second

right interspace, due to atheroma of the aorta or roughened semilunar valves.

The enlargement of the left ventricle may be so great as to cause a relative mitral incompetency, which will cause a systolic murmur of soft and blowing quality in the mitral area.

Flint's Murmur—This is a presystolic or a diastolic murmur limited to the apex, soft in quality, caused by the vibration of the mitral leaflets; on account of the hypertrophy of the left ventricle they are not forced tightly against the heart wall and the reflux of blood produces the vibrations.

Secondary Effects—Palpitation, dizziness, dyspnœa, particularly at night, and general venous stasis.

Sudden death is likely to occur in this form of heart disease.

Tricuspid Obstruction.—This condition is rare—usually congenital.

The physical signs are the same as those of mitral stenosis with their positions transposed. Constant cyanosis and dyspnœa will aid in the diagnosis.

Pulmonary Regurgitation.—Rarest of all valvular diseases. The physical signs are those of aortic regurgitation. It is distinguished from this by the point of the maximum intensity of murmur, which is the left second interspace, the right ventricle is enlarged; absence of the Corrigan pulse and absence of the associated signs of aortic regurgitation.

The Frequency with which Valves are Affected.—The valves in which organic murmurs occur, arranged in order of their frequency, are as follows:

(1) The Mitral valve.
(2) The Aortic valve
(3) The Tricuspid valve.
(4) The Pulmonary valve.

Arranged according to the time of the murmur, we find that a systolic murmur is due in the vast majority of instances to mitral regurgitation or aortic stenosis; the former heard loudest at the mitral area and transmitted to the left; the latter heard loudest at the aortic area and transmitted upward into the vessels. These facts, if kept in mind, will render a differential diagnosis easy.

A diastolic murmur is almost always due to aortic regurgitation. Its transmission over the præcordia from the right second interspace downwards and to the left, together with the associated signs, makes the diagnosis certain.

Great care must be exercised in taking the time of the murmur, which is the most essential element in avoiding mistakes in diagnosis.

Hemic Murmurs.—The distinguishing features of hemic murmurs are that they are always systolic in time, heard loudest over the pulmonary area, occasionally over the aortic area; they are soft, blowing and low pitched in character and are not transmitted.

Structural alterations are not present in the heart or valves. They are associated with anæmia or other diseases causing impoverishment of the blood.

Exocardial Murmurs—PERICARDIAL FRICTION.—A friction sound, due to a roughened condition of the adjacent or apposed layers of the pericardium, is heard with its greatest intensity near the base of the heart, usually in the third and fourth interspaces. It is a to-and-fro sound, corresponding with the movements of the heart. It is not transmitted, and may change its position or become modified by a change in the

excited of the individual or when pressure is exerted during auscultation.

PLEURO-PERICARDIAL FRICTION. — This friction sound corresponds to the action of the heart and is caused by an inflamed pleural surface of the pericardium coming in contact with an adjacent inflamed portion of the visceral pleura, it having its greatest intensity during full inspiration, and may disappear during expiration, because of the receding of the lung and consequently the apposition of smaller inflamed areas.

FALSE MURMURS.—Murmurs of a whiffing character, produced by the motion of the heart, causing compression of lung tissue, are called cardiac-pulmonary murmurs. They are often associated with emphysema or phthisis, and if persistent they require a very careful study with reference to their cause.

Their differentiation from organic murmurs may be made by a review of the following table from Kintzing:

ORGANIC MURMURS	FALSE MURMURS
(1) Quality oftenest blowing.	(1) Often superficial, quality frictional.
(2) Oftenest exactly synchronous with systole or diastole.	(2) Time not synchronous with beginning systole or dyastole. May precede or follow, are rarely diastolic.
(3) Definite seat of maximum intensity marked by anatomic point. Areas of propagation definite.	(3) Seat, point of maximum intensity varies. Often heard at both base and apex without change in quality. Area of propagation irregular, not coincident with corresponding organic area.

ORGANIC MURMURS	FALSE MURMURS
(4) Little affected by change in position or by holding breath. Intensity increased by forced expiration. Some heard only in recumbency.	(4) Many disappear when patient is recumbent or upon sustained full inspiration.
(5) If heard in mouth or trachea is aortic stenosis or aortic aneurism. Mitral murmurs never.	(5) Many heard in mouth, especially "air impact" murmurs.
(6) Pulmonary engorgement common.	(6) Pulmonary engorgement absent. May be anæmia.

CHAPTER VIII

THE PULSE, BLOOD-VESSELS, AND NEUROSES OF THE HEART

The Pulse and Blood-Vessels.—The best time to take the pulse must be in every case determined by the examiner. It is, however, the opinion of the majority of observers that the best results are obtained from an examination of the pulse made before any physical examination of the lungs is attempted, for the reason that all modifying circumstances are eliminated and the heart's action is not disturbed by any physical or mental excitation.

For the sake of convenience the pulse is usually taken in the radial arteries, and both should be examined to detect any disparity or anomalous distribution.

The pulse is properly taken by having the applicant assume the sitting position with the arms partially flexed and resting on a support. He must be thoroughly comfortable and free from any restraint that may interfere with the free circulation of the blood.

The investigation of the pulse and the determination of its clinical elements include the following points:

(a) Rate, (b) size and condition of the vessels and their walls, (c) rhythm, (d) tension, (e) pulse wave.

(a) Normally the pulse rate in a healthy man may be stated to be 72 per minute sitting and 80 standing.

An increase in the rate may be due to heredity, but this is too difficult of determination to be of prac-

tical value and should not be considered in life insurance examinations.

A temporary increase in the rate is observed during an examination and is easily perceived by a careful examiner. It has no diagnostic significance.

These temporary causes may include the taking of alcoholic beverages, tea, coffee, and the taking of food, exercise, mental emotions, tobacco.

The terms expressive of the physiological or pathological conditions of the pulse used by Brubaker are as follows:

"Thus the pulse is said to be frequent according as it exceeds or falls short of a certain average number—72 per minute; quick or slow according to the suddenness with which the expansion takes place or strikes the fingers; hard or soft, tense or easily compressible, according to the resistance which the vessel offers to its compression by the fingers; large, full or small, according to the volume of blood ejected into the aorta, or, in other words, the degree of fulness of the arterial system."

As the pulse rate coincides with the action of the heart, anything that disturbs or modifies the heart will have its corresponding effect on the pulse.

The pulse should be taken for a full minute, noting the rate at each quarter.

The pulse should not be taken soon after exercise, a physical examination of the lungs or a heavy meal, because of the acceleration following exercise and accompanying the process of digestion.

(b) The size and condition of the vessels and their walls are determined at the same time. If the pulse

is obliterated by compression, the vessel is imperceptible except in the very thin, when, however, it can be distinctly differentiated under the compressing fingers of the examining hand, if the sensation imparted is leathery, cord-like or tortuous, the walls are thickened or sclerosed; all degrees of sclerosis are observed from that which is simply appreciable to absolute rigidity; again running the fingers along the vessel calcareous deposits may be detected which impart a roughened or beaded feeling to the fingers.

(c) The rhythm must be noted, *i.e.*, we must ascertain if the beats are equidistant, the volume, strength, and duration the same in symmetrical arteries. This may vary in two radials. A weak or obliterated pulse in the right radial may be caused by aneurism of the ascending aorta; in the left radial, of the descending aorta.

(d) Tension. The normal tension of the pulse is maintained by the action of the heart and the resistance offered by the smallest arteries and the cohesion of the blood itself.

A full knowledge of the different degrees of tension is acquired by practical experience and the aptitude of the examiner.

Musser offers the following with reference to the recognition of tension:

" High arterial tension is recognized by (a) incompressibility and tension of the arteries; (b) accentuation of the aortic second sound; (c) prolongation of the left ventricle first sound; (d) increased flow of urine, pale and watery; (e) the characteristic pulse-tracing.

" Permanent high tension leads to hypertrophy of the heart and more or less atheroma."

" Low arterial tension is recognized by (a) soft, compressible, often dicrotic pulse; (b) enfeebled sounds, aortic second and left ventricle; (c) scanty, high colored urine; (d) the characteristic pulse-tracing.

" Permanent low tension leads to stasis, congestions and cyanosis, with general weakness and impaired nutrition."

An increase in blood pressure according to Brubaker is due to " An increase in the rate or force of the heart's contraction, an increase in peripheral resistance or an increase in the volume of arterial blood."

" The converse of the above holds true in reference to a decrease of the blood pressure."

A continued high tension after repeated examinations is pathologic.

An increase in resistance is caused by contraction of the arterioles as seen in gout, lithæmia, cirrhosis of the kidneys, mitral stenosis, and arterio-sclerosis.

Increase in volume occurs in the condition known as plethora.

A decrease in blood-pressure is caused by a weak heart, aortic incompetency, dilatation of the arterioles. In the obese it is occasionally seen, also when the volume of blood is reduced.

(e) Pulse wave. The pulse wave is the expansion of the artery throughout the entire arterial system, denoting the volume of blood and duration, together with the condition of the vessel, between diastole and systole.

The volume will vary as well as rhythm, *i.e.*, it may be large, moderate or small.

The duration of the wave is to be determined with reference to the gradual or sudden ascent, sustained duration, the gradual or sudden descent.

The principle conditions in which the pulse wave determines the value of its diagnostic importance are as follows:

Mitral Stenosis—Wave small, ascent and descent gradual, artery not well filled.

Aortic Stenosis—Pulse small, hard, slow, and jerky.

Aortic Incompetency—Pulse-wave large, ascent rapid, descent rapid, and vessels feel collapsed.

Arterio-Sclerosis—Pulse small, hard, forcible, duration of wave prolonged.

Aneurism—Difference in pulse wave in symmetrical arteries.

Neuroses of the Heart—PALPITATION.—While palpitation may occur in any form of heart disease and is common in the normal heart, it occurs most frequently in persons of a nervous temperament as a result of worry, flatulency due to gastric indigestion, excessive indulgence in alcohol, tobacco, tea, and coffee; it is one of the symptoms of exopthalmic goitre and a sequel to the acute infections.

TACHYCARDIA.—A persistent frequency of the heart's action is present in some forms of organic lesions (dilatation and myocarditis), neurasthenia, incipient tuberculosis, or may be present with palpitation of gastric origin, locomotor ataxia, sexual excesses, or it may be a pure paroxysmal tachycardia.

ARRHYTHMIA.—Intermittent heart action is found in most of the organic heart diseases (fatty degenera-

tion and valvular lesions); lithæmia, gout, indigestion, chronic alcoholism, excessive use of tea or coffee, and during the administration of digitalis (of toxic origin), in nervous persons from overwork or strain.

Musser states, "that both irregularity and intermittency may exist in persons otherwise in good health; but irregularity is more likely to be of serious import than intermittency."

BRADYCARDIA.—The pulse may be normally slow in some individuals (60 to 40).

The usual conditions causing decreased frequency of the pulse are as follows:

Convalescence from acute infections (Riegel), chronic digestive disorders, diseases of the brain and heart, emphysema (from increased resistance in the pulmonary circulation), Bright's disease (from increased resistance in the arteries).

Bradycardia from chronic digestive disorders is of toxic origin, the poisonous substances circulating in the blood have an inhibitory effect on the heart.

The prognosis is good in this class. If due to atheroma of the coronary arteries or disease of the brain, the prognosis is unfavorable.

EMBRYOCARDIA.—Embryocardia is of serious import and denotes dilatation or chronic degenerative changes in the heart.

CHAPTER IX

PHYSICAL EXAMINATION OF THE ABDOMEN

Introduction.—The number and importance of the organs contained in the abdominal cavity renders it necessary for the examiner to devote special care and attention to the investigation of this region.

Many difficulties are presented, and the general results obtained are not as satisfactory as those obtained by examination of the organs of the chest; because of the close physical relationship of the organs, it does not necessarily follow that their reciprocal dependence and mutual relations will form a chain of symptoms that may be regarded as pathognomonic. This freedom of inter-dependent symptoms increases our embarrassment and often contributes materially to the perplexities of diagnosis.

Technic.—Accuracy and good results are obtained by following consistently a general plan and afterward applying any clinical method that may suggest itself to the examiner.

During an examination of the abdomen the applicant must be placed in an attitude comfortable and so adjusted that all muscles are relaxed and no tension from this source exists. It is also advisable to examine the applicant in the erect, the recumbent, and the knee-chest position.

Abdominal Areas.—The division of the abdomen into areas for the purpose of description and the loca-

tion of the different organs, has been the subject of much controversy, and while each division has its adherents, the method offering a solution of this problem having simplicity as one of its essential characteristics and at the same time eminently satisfactory, is the method of Ballance.

Two lines, one vertical and the other horizontal, intersecting at the umbilicus, will divide the abdomen into four quadrants.

The right upper quadrant contains:

The head of the pancreas,
The right lobe of the liver and the gall-bladder
The right kidney,
The pylorus,
The hepatic flexure and part of the transverse colon.

The left upper quadrant contains:

The pancreas,
The left lobe of the liver,
The left kidney,
The stomach,
The spleen,
The splenic flexure and part of the transverse colon.

The right lower quadrant contains:

The cæcum,
Ascending colon,
Appendix,
Right ovary and tube.

The left lower quadrant contains:

Sigmoid flexure,
Descending colon,
Left ovary and tube.

Inspection.—This reveals the size and shape of the abdomen, the condition of the skin, and the presence or absence of local enlargements, marks, or scars.

The shape will vary in health. As age advances the abdomen is apt to become enlarged, this being especially so in women.

The waist line in women is in great disproportion, because of the practice of lacing, the effects of which are to crowd the liver and stomach downward, to lessen the costal angle and limit the breathing capacity of the lower thorax.

If whitish lines or striæ are present, their presence is an evidence of continued distension caused by pregnancy, fat, ascites, or tumors; any copper-colored spots are significant of secondary syphilis; enlarged glands may be the result of past or present venereal or malignant disease; any enlarged veins, especially in the region of the umbilicus (caput Medusæ), indicates an obstructed portal circulation (cirrhosis or tumor of the liver); any obstruction to the cavæ, causing the establishment of a collateral circulation by anastomosis through the mammary or epigastric veins, may be due to abdominal or mediastinal tumors. The determination of the location depends on the course of the circulation through the veins.

Movements.—Abdominal movements may be due to either respiration or peristalsis.

In health the rise and fall of the abdomen is synchronous with the respiration.

In disease this is disturbed or restricted, the stomach and liver particularly. The latter will rise and fall with the excursions of the diaphragm, and in persons

having thin walls this is extremely noticeable—the movements of the shadow can be clearly seen—therefore in cases where tumors are attached to the liver, of an enlarged gall-bladder and tumors of the pyloric end of the stomach, their ascent and descent will be synchronous with respiration. As a differential point in diagnosis this is valuable.

Epigastric pulsation (q.v.) is often observed, particularly when the walls are thin.

Hepatic pulsation is synchronous with the pulsation of the heart and is due to dilatation of the right heart.

Palpation and Percussion.—The best results are obtained in palpation of the abdomen by having the hands warm, for cold hands applied to this region will cause involuntary muscular contraction and thus defeat our purpose. The whole hand, flat on the abdomen, is preferable to the tips of the fingers. Poking with the latter will often result in disappointment to the examiner and he cannot hope to accomplish much.

The pressure to be exerted will vary according to the end desired. When deep palpation is necessary, one hand may be reinforced by placing the other on the palpating hand. Conjoined manipulation may be practiced in order to more fully outline an underlying organ or growth.

The applicant should be examined first in the recumbent posture, and in order to fully relax the parietes the legs and thighs must be partially flexed, the head and shoulders slightly raised.

It is sometimes necessary for the applicant to assume the knee-chest position in cases where tumors are found or pulsations are present.

A differential point in the diagnosis between an aneurism and a tumor will be made clear. If the pulsation ceases or is lessened, it is known that the pulsation is transmitted from an artery, because in this position a tumor by its weight will fall from the vessel beneath.

Palpation of the abdominal walls is practiced to determine their thickness, distension, laxity, retraction, the presence of tumors, pulsations, and tenderness.

Thickness, together with the amount of fat present, is estimated by taking a fold of the wall between the thumb and the fingers.

Increased thickness may be due to a large deposit of fat or œdema. When due to the latter, it may be more or less distributed, but is usually more prominent at the lower part and the wall will pit on pressure.

Enlargement of the abdomen may be general or local.

General enlargement may be the result of gaseous accumulation, an abnormal deposit of fat, as seen in obesity, dilatation of the colon or stomach, pregnancy, the presence of fluid, or enlargement of the spleen.

Fluid in the peritoneal cavity usually denotes cirrhosis of the liver or obstruction of the portal circulation by a tumor of the liver. It may be a cyst, cancer, or syphilitic.

Enlargement from the spleen is found in malaria and leucæmia.

Enlargements beginning in the lower abdomen and gradually becoming general are usually due to diseases of pelvic origin, pregnancy, uterine, or ovarian cysts or tumors; the enlargement in these cases is almost uni-

form; if any difference exists, it is that the anterior-posterior diameter is increased.

Local enlargement may be a gaseous distension of the intestines in hysterical or nervous women, a spasmodic contraction of a muscle or part of its fibres, aneurism, a malignant growth of the liver, stomach, pancreas or intestines, enlarged or cystic kidney, induration from recurrent appendicitis, tubercular peritonitis or hernia.

In case a tumor is present a full and minute description must be given with reference to its location, size, mobility, fluctuation, rapidity of growth and associated symptoms.

Laxity of the walls is observed after pregnancy and dropsy.

Retraction is seen in all wasting diseases, tuberculosis, cancer, chronic dysentery, and lead poisoning.

Tenderness is found usually over the diseased organ.

Percussion of the abdomen confirms the conclusion of inspection and palpation, and furnishes additional information with reference to the size, shape and consistency of the organs and their contents.

The flat, dull, and tympanitic notes elicited by percussion are the three notes with which the examiner must become entirely familiar, together with the extent over which these notes are heard normally. It is then an easy matter to detect any increase in the size of the organs, the presence of a new growth, and by the change of quality to estimate the tension of the hollow viscera.

The fingers are better adapted for abdominal percussion than an artificial plessor and pleximeter, for

the reason that the resistance offered is better appreciated, and with the aid of the tactile sense we are enabled to form a conception of the consistency of the parts beneath and their relations to each other.

The best position of the applicant is the recumbent, as in palpation.

Abdominal Organs —THE STOMACH. — Inspection and palpation of the normal stomach, when not distended, does not offer any evidence or information as to its size or location. Percussion, however, will elicit a tympanitic note that is characteristic, and by this note it can be differentiated from the organs in its immediate vicinity.

For practical diagnostic purposes, we may describe the stomach when moderately distended as follows:

The cardiac orifice is about one inch to the left of the junction of the left seventh costal cartilage with the sternum.

The pyloric orifice is movable, but usually lies between the right sternal and para-sternal lines, on a level with the ensiform cartilage.

The upper border corresponds to the lower border of the fifth rib in the mammary line, and the lower border to a line about two and one-half inches above the umbilicus.

The larger portion lies to the left of the median line about five sixths, according to Butler.

The examiner must be chiefly concerned in assuring himself that the stomach is normal in size and position and that tumors and growths are absent.

Palpation enables us to detect the presence of tumors and benign growths. The most common, however,

are the carcinomatous tumors, which are usually found in the pyloric region, and may be detected early by the increased resistance to the palpating hand.

Tenderness is found in gastritis, cancer, and ulcer; the diffusion and localization of the tenderness is in the order named, *i.e.*, in gastritis it usually covers the entire area of the stomach. It is, however, not constant.

In cancer the tenderness is localized near the seat of the tumor, while in ulcer the tenderness is constant and circumscribed and can be located with great accuracy.

Percussion as ordinarily practiced affords an opportunity of ascertaining approximately the size of the viscus and an assurance that neither an enlargement nor a growth is present.

Normally the lower border of the stomach is never below the line of the umbilicus; therefore, any increase in the vertical diameter denotes either a prolapsus or dilatation.

The line of the lower border can be determined by differentiation of the stomach and colon tympany (which closely resemble each other) by percussing the region with the applicant in the erect position after having him drink one or two glasses of water. The liquid in the stomach causes a line of dulness, and as the quantity drunk is increased, the width of the dulness increases.

THE LIVER.—The liver is a comparatively movable organ, with its upper border generally well fixed, and but little change can be detected from the normally established boundary, except in diseases of the thorax.

It is the examiner's endeavor, therefore, to assure

himself that a normal condition exists, and inasmuch as the characteristic diagnostic features of diseases of the liver are chiefly confined to changes and alterations in its shape, size, and surface, an accurate knowledge of its normal anatomical limitations is necessary.

Unless very marked changes have taken place inspection will yield a negative result. Palpation enables the examiner to determine the lower border when the subject is thin and the abdomen not distended with gas.

In order that the best results may be attained by palpation, the abdominal muscles must be relaxed by placing the applicant in the recumbent posture, the shoulders elevated, legs semi-flexed, and the warm hand placed on the abdomen, with the fingers directed inward and toward the median line. Full inspirations should be taken.

By careful intermittent pressure with the finger tips the free margin of the liver can be distinctly appreciated if enlarged.

It must be remembered that it is of the greatest importance to differentiate a contraction of the rectus muscle, a displacement of the liver, a floating or an enlarged right kidney, fecal accumulations, an artificial lobe and cancer of the stomach.

Following the free margin of the liver with the fingers, and its movability during respiration, will assist in making the diagnosis clear.

Percussion.—The upper border of the liver can be determined by percussing from above downward along the median line, the right mammillary line, the mid-axillary and scapular lines.

Dulness is found near the base of the ensiform

cartilage for the median line, the fifth interspace (sixth rib), for the right mammillary line, the seventh interspace (eighth rib), for the mid-axillary line and the ninth interspace (tenth rib) for the scapular line.

The normal width of the liver is about four inches in the mammillary line and scapular lines, and about six inches in the mid-axillary line.

THE SPLEEN.—The spleen occupies a position between the ninth and eleventh ribs, extending from about the mid-axillary line anteriorly to about two inches from the posterior median line.

Inspection and palpation are negative when the spleen is normal.

The percussion area measures about 2½ by 3 inches, and any enlargement is practically determined by an increase in the vertical dulness. When it exceeds to an appreciable extent the normal measurements, it is known that the spleen is enlarged.

If the dulness exceeds the normal area, the examiner must be satisfied that the dulness is of splenic origin, for an error may be made and an apparent increase in splenic dulness may result from pleural thickening, a new growth in the base of the lung, or fecal accumulation in the splenic flexure of the colon.

Any marked increase in the size of the spleen may be due to syphilis, leucæmia, chronic malaria, amyloid disease or cancer.

Generally in splenic enlargement the subjective symptoms are wanting, and on palpation the spleen will be found to be uniform, smooth and without local symptoms (pain or tenderness).

THE GALL-BLADDER.—Normally the gall-bladder is not palpable.

It is located behind the ninth costal cartilage, just external to the edge of the right rectus muscle.

Tenderness in this region may be significant of tumors, gall-stones, or an inflammatory condition of the gall-bladder.

THE INTESTINES.—General inspection, palpation and percussion of the large intestine, the small intestines, including the region of the appendix particularly, should always be made a part of the examination. New growths, tenderness, adhesions, indurations, and ascites may be discovered as a result.

CHAPTER X

EXAMINATION OF THE URINE

Introduction.—The importance of a careful and intelligent study of the urine must be fully appreciated by the examiner on account of the usual stability of the secretion and its value as an index of the metabolic changes occurring within the body.

QUANTITY.—The volume of urine voided in 24 hours by a healthy individual is about 50 ounces.

This total amount may vary within the limits of health according to the amount of liquid taken, the activity of the skin, and the season of the year.

It is diminished in summer, when the skin is freely acting and when the bowels are loose; on the other hand, cold, constipation, and nervous excitement will increase the quantity.

A persistent increase or decrease from the normal amount may be considered pathological.

A persistent increase is notably present with a low specific gravity in chronic interstitial nephritis and diabetes insipidus, and with a high specific gravity in diabetes mellitus.

High arterial pressure occasioned by an hypertrophied heart will cause an increased amount of urine.

A decreased quantity is found in acute Bright's disease, chronic parenchymatous nephritis, cirrhosis of the liver, obstruction of the venal circulation or a weak heart, whether in the muscle or an uncompensated valvular lesion.

COLOR.—The normal color of urine is amber or straw colored, shaded to a reddish brown.

The color will vary and is affected by diet, imbibing large quantities of water, medicine, and disease.

A pale urine, usually, denotes an excessive quantity of water taken into the system, diabetes, chronic interstitial nephritis, or neurasthenia.

A smoky or black color indicates the presence of blood. Its source may be in the kidney, ureter, or bladder, and its cause tuberculosis, calculi, malignant or benign growths, or pyelitis.

DENSITY.—The average normal density is about 1020; this may vary from 1010 to 1030, depending largely on the time of day at which the urine was voided.

The density is increased in proportion as the quantity is decreased; this will be found to be the case in those taking chiefly a meat diet, when the perspiration is copious, and during active exercise.

When the density is high (1035 to 1040) and the urine pale, diabetes mellitus is suspected.

The density is low when large quantites of water are taken, when the diet is confined chiefly to vegetables, and those conditons exist which cause an increased secretion of the urine.

REACTION.—The normal urine is acid in reaction, owing to the presence of the acid phosphates of sodium and calcium.

It may be neutral or slightly alkaline two hours after a mixed meal.

If it is alkaline in reaction, it may be due to a

dietetic condition. If persistent and this cause is eliminated, it is abnormal.

Usually it is from alkaline fermentation due to cystitis, debilitating diseases, or the administration of alkalies internally.

CHEMICAL EXAMINATION.—Excellent results are obtained without expensive or elaborate apparatus.

Care and patience are the essential requisites on the part of the examiner, together with the knowledge that the reagents are made from chemically pure substances.

It is absolutely necessary that the urine be clear; otherwise the tests cannot be applied with any degree of accuracy in the results.

Turbidity may be present in both acid and alkaline urines. If it is present in the former and disappears on the application of heat, it is due to urates; if present in the latter and disappears on the addition of acetic acid, it is due to the earthy phosphates.

If the turbidity still remains after the application of these tests, it is probably due to an admixture of pus or blood.

The amount of solids in the urine can be approximately estimated by multiplying the last two figures of the density by 2.33, which represents the total solids in each 1000 c.c. of urine. This is known as Haser's coefficient.

Albumin.— The importance of the detection of albumin, particularly when the quantity is small or when only a trace exists, is apparent to all examiners. The technic and method of procedure, therefore, must follow an absolutely clear and well defined plan. These valu-

able and practical points are presented by Dr. J. Bergen Ogden in a most excellent manner. (A Plea for Uniformity of Tests for Albumin and Sugar among Medical Examiners.)

"The urine should always be filtered through a high grade of filter paper, and through several thicknesses if necessary, before applying any of the tests for albumin. To some this may seem a trivial matter, but I consider it one of the most important steps in conducting a careful and reliable albumin test. All urines contain suspended matter, sometimes in large but often in small amounts, which must be removed in order to detect small traces of albumin. . . . A good filter paper will clarify all urines except those containing chyle and many bacteria. A specimen containing bacteria can be clarified by precipitating the earthy phosphates with ammonium hydroxide and filtering; the precipitate of phosphates carries with it the bacteria. The urine thus treated is, after filtration, rendered faintly acid with 10 per cent. nitric acid, and it is then ready for the albumin tests. A urine containing chyle can be clarified only by shaking with ether. . . . A urine should not be tested for albumin by the nitric acid contact test immediately after it has been voided, but sufficient time should be allowed for the specimen to approximate room temperature . . . for it is a fact that warm urine does not respond nearly as readily to Heller's test as cold urine. . . . Tests for albumin should not be made or read by artificial light. . . . My experience has convinced me that albumin is very apt to be, and often is, overlooked as a result of this practice, particularly when

only a small trace is present. . . . No test for albumin can be depended upon unless it is read by good natural light."

Heller's Test.—A clean, dry test tube is filled to the depth of two inches with filtered urine.

The test tube is then inclined until the urine is near the edge. Pour under slowly pure cold nitric acid until the volume of the acid equals one-third of the urine used.

The tube should be allowed to stand for five minutes, and if albumin is present a white zone at the point of contact is observed, and generally the width of the zone is an index of the amount of albumin present.

In order to be absolutely certain of the positive or negative result of this test, the tube should be allowed to remain for half an hour, on account of the fact that this length of time may be required to develop the reaction, when the quantity of albumin is scanty.

This test is accurate. Only two sources of error exist from a practical point.

(1) Nucleo-albumin may show above the albumin (and be mistaken for it) as a cloud forming a second ring. In order to distinguish these the test should be repeated by diluting the urine with two or three times its volume of water, in which case the ring or zone due to albumin is diminished, and the ring or cloud due to nucleo-albumin may be unchanged, increased or merely a haze.

(2) In case the second ring is due to resins administered internally, the addition of a small quantity of alcohol will render it clear.

THE SALT AND ACETIC ACID TEST.—(1) Two or

three drams of urine are poured into a test tube, to which add from 3 to 6 drops of a 50 per cent. solution of acetic acid.

(2) Filter until clear.

(3) Add one-sixth of its volume of a saturated solution of common salt.

(4) Boil. Any cloudiness or precipitate is serum-albumin.

A positive reaction after the employment of these tests denotes that albumin is undoubtedly present. Their simplicity and trustworthiness renders them especially valuable to the examiner.

QUANTITATIVE ESTIMATION OF ALBUMIN.—The most simple test, and one that gives good results and is sufficiently accurate for practical purposes, is the one performed by the *Esbach Albuminometer.*

This is a glass tube lettered and graduated.

The tube is filled with urine to the mark U. The urine tested must be a portion of twenty-four hour urine. A solution of picric acid should be added until the level of the fluid reaches the mark R.

The solution is as follows: Picric acid 10 grammes, citric acid 20 grammes, dissolve in 900 c.c. of hot distilled water; after cooling dilute to 1000 c.c. A rubber cork is then inserted and the tube inverted a number of times to insure a thorough mixture. This is allowed to stand for twenty-four hours.

The albumin, when present, is precipitated and measured by the numerical scale, each figure representing 1 one per cent. of albumin.

THE CENTRIFUGAL METHOD.—A more rapid de-

termination of the amount of albumin present is by the centrifugal method.

Fill the test tube supplied with the machine to the line marked 10 c.c., add to this 3.5 c.c. of a potassium ferrocyanide solution (1 to 10) and 1.5 c.c. acetic acid (50 per cent.); mix thoroughly and revolve for 3 to 5 minutes in the centrifuge or until the albumin is deposited at the bottom and the supernatant fluid is clear.

The height of the albumin on the numerical scale represents the per cent. present.

Sugar.—FEHLING'S TEST.—Fehling's solution is prepared as follows:

Solution No. 1—34.65 grammes of pure crystallized copper sulphate is dissolved in 200 c.c. of warm distilled water.

Distilled water is then added to make the quantity 500 c.c.

Solution No. 2—180 grammes of Rochelle salt is dissolved in 300 c.c. of warm distilled water. Add pure caustic soda 70 grammes.

When cool, distilled water is then added to make the quantity 500 c.c.

These two solutions should be kept in separate rubber-stoppered bottles in a dark place.

When it is desired to make an examination of urine, equal quantities of these solutions should be thoroughly mixed, the resulting mixture being a dark blue color.

About one dram of this mixture is placed in a test tube and gently boiled. The urine is then added drop by drop until a reaction takes place or until an equal volume of urine is added to the mixture.

If sugar is present the solution assumes a yellow

turbid appearance and soon a precipitate of yellowish-red color is seen.

PRECAUTIONS.—The solutions must be comparatively fresh for they are not stable.

It is necessary that the urine be brought to the boiling point and the boiling not continued; otherwise a precipitate caused by other substances will fall, they causing a reduction of the cupric oxide. The color of the precipitate in these cases is greenish or greenish-yellow and not red as in the case when the reduction is caused by sugar.

HAINES' TEST.

Formula:—Pure Copper Sulphate, 30 grains
Distilled water, 1 oz.
Dissolve and add
Pure Glycerin, ½ oz.
Mix thoroughly and add
Liquor Potassæ, 5 oz.

One drachm of this solution is poured into a test-tube and gently boiled. Add the urine drop by drop until six or eight drops have been added; again boil.

A yellow or red precipitate indicates the presence of sugar.

This solution is much simpler and has the advantage that it is not necessary to keep two solutions. It is stable for, at least, one month.

The same precautions given under Fehling's Solution apply and must be observed.

PHENYLHYDRAZIN TEST.—To 50 c.c. of urine add 2 grammes phenylhydrazin hydrochloride and 2 grammes sodium acetate, 10 c.c. of water added will hasten solution. Place the test tube in a water bath and keep at the boiling point for one-half hour.

When cool and sugar is present a deposit of yellow needle-like crystals (phenylglucosazone) is visible to the naked eye.

Scales or brown granules or balls do not indicate sugar.

This test is exceedingly accurate and is not open to the objections and precautions named above.

QUANTITATIVE ESTIMATION OF SUGAR.—Robert's test is approximately accurate and very simple.

Two large bottles are procured and into each 4 ounces of urine are poured; add to one bottle ¼ cake of compressed yeast and cork with a perforated cork; both are then set aside for twenty-four hours.

After the completion of fermentation the density of each sample of urine is taken separately.

The carbonic anhydride and alcohol formed by the fermentation reduces the density one degree for each grain of sugar per ounce.

THUS: If the specific gravity is reduced from 1045 to 1035 the urine contains approximately 10 grains of sugar to each ounce of urine.

Pus.— Pus causes marked turbidity of the urine and is soon deposited, on standing, as a whitish sediment.

Neither heat nor acids will cause its disappearance: hence this eliminates the urates and earthy phosphates as causative factors. On the contrary both of these procedures will cause an increase in turbidity when due to pus.

DONNE'S TEST.—After standing, decant the urine from the sediment and add to the latter a piece of caustic potash or soda and stir with a glass rod.

If the sediment is due to pus the whitish color will

be changed to green and the mass will become viscid, ropy and adherent; if the quantity of pus is small the alkali is added to the urine instead of the sediment, in which case the fluid becomes mucilaginous.

This test is positive. No other substance will cause this reaction.

Alkapton.— This is frequently mistaken for sugar on account of its reduction of copper.

There is, however, no reaction to phenylhydrazin. Its presence is unimportant.

CHAPTER XI

DISEASES AND CONDITIONS AFFECTING LIFE INSURANCE

Abscess.—Questions concerning this should be carefully answered; a full and detailed description is desired in each case.

Abscesses in certain regions, such as, the knee, hip joint and neck, suggest tuberculosis; in the groin, venereal disease or appendicitis; on the legs, syphilis or varicose veins.

A fistula may result in an abscess in the anal region.

Carbuncles are often associated with diabetes.

Alcoholism.—The predisposing influences, which exert such powerful effects, are found in the modern social conditions, occupation playing an important part, when we take into consideration those directly concerned in the manufacture of alcoholic liquors and those dispensing them; exposure to the inclemencies of the weather, in the cases of cab-men, car-drivers, expressmen, etc., must be considered; heredity holds an important place; again habit among active business men stimulates a deteriorating nervous system, in which cases "alcohol weakens the power of resistance to renewed temptation."

Alcohol is one of the chief factors in the causation of diseases of the nervous system. Particularly, in the beginning, the nutrition is affected, so that before any symptoms or physical signs are manifested an alcoholic

cachexia is established and is recognized by a lessened resistance to physical exertion, fatigue showing earlier and lasting longer, convalescence from acute diseases is prolonged, the physical signs showing later in the furred and tremulous tongue, irritable heart and unsteady voluntary muscles.

In all cases the examiner must state specifically the kind of alcoholic beverage taken, spirituous, malted, or fermented, the daily amount and the time of day each is taken.

The occasional or habitual indulgence must be clearly and definitely stated.

Aneurism.—Green says: "Very few cases of aneurism are detected by medical examiners, and the reason, no doubt, is to be found in the fact that too little attention is paid to the region of the aortic arch."

The pressure symptoms may be latent, depending on the size, site, and progress of the growth.

If cough, pain, dyspnœa or dyspeptic symptoms are discovered, a careful examination of this region should be made, particularly for pulsations and pulsating prominences. We must avail ourselves of oblique illumination, comparing the pulse wave in the radials, and seek for the tracheal tug.

Aneurism of the abdominal aorta is not nearly so frequent as that of the arch. The chief subjective symptom is pain referable to this region, and a diagnosis is made by finding a distinct tumor, capable of being grasped and having a distinct expansible pulsation.

Appendicitis.— Under this title it must be absolutely clear to the examiner that this disease exists, inasmuch

as he is often misled by the applicant in attributing a relapsing or recurrent appendicitis to other causes. Therefore, a clear history from the symptoms elicited to establish this fact must be deduced in order that an intelligent presentation of all facts can be made to the medical department.

If the examiner is satisfied in his own mind that such is the case, he must state the number, severity and duration of the attacks.

If an operation was performed, he must state whether the appendix was removed or the abscess opened and simple drainage established; if any complications attended the recovery or if any post-operative condition exists, such as, hernia, disturbed digestion or constipation.

Asthma.—Asthma may have as its cause the lungs, the heart or the kidneys.

In bronchial asthma the chief symptom is an expiratory dyspnœa. It may be due to a neurosis, an external or exciting cause or a reflex condition.

It exhibits itself in those of a neurotic diathesis. The prognosis in this class is good as to life, but in those cases of long standing an emphysema or chronic bronchitis usually supervenes.

In asthma due to the heart the paroxysms appear during exertion or are influenced by certain body positions; in these cases the breathing resembles the Cheyne-Stokes type and the prognosis is serious.

In asthma of renal origin there may be slight œdema of the feet with occasional attacks of dyspnœa and palpitation.

An examination of the urine will reveal the cause in chronic nephritis.

Hay asthma may be accompanied by any of these forms and must be differentiated from them, and in all cases an urinalysis must be made.

The number, severity, and date of the last attack, and the cause must be determined, and all facts must be presented.

Colic and Cramps.—These conditions may be due to a temporary disturbance of digestion, but pain, if referred to the abdomen, is characteristic of gastro-intestinal disease of a more serious nature. Therefore a history of colic must be taken up with care and its origin, frequency, severity, and nature must be established.

In colic of renal origin the pain is sudden, sharp and severe, beginning in the lumbar region and following the ureter, is felt in the testicle (which is retracted) and on the inner side of the thigh; this pain ceases suddenly and is followed by a period of prostration with bloody or smoky urine.

Biliary colic, caused by the passage of gall-stones, closely resembles the renal type and is differentiated from it by the seat and radiation of the pain to the right shoulder and the presence of jaundice.

The colic or pain due to a floating kidney is dull and dragging in character. It usually confines itself to the lumbar or sacral region. At times, however, the pain may be extremely acute.

The diagnosis must rest with a physical examination.

Colic due to abdominal aneurism (see aneurism).

Colic of appendical origin, when of a recurrent type,

can be differentiated by the gradual shortening of the time between the attacks, with an incomplete recovery in the interim, together with some induration, due to adhesions in the right iliac fossa.

In colic due to lead poisoning the pain is diffused from the umbilicus as a center. The blue line on the gums and a knowledge of the applicant's occupation will make the diagnosis clear.

The neuralgias and the seizures of locomotor ataxia must be clearly differentiated.

Colic due to gastric ulcer will give a history of dyspepsia and of vomiting of blood, and usually the individual will exhibit an anæmic condition.

Constipation.—Obstinate constipation results in the lateral pouches of the colon becoming distended until fecal tumors are formed; pressure from these masses may cause ulceration, fissure, fistula, hæmorrhoids, and prolapsus of the rectum.

The general nutrition of the body is impaired, rendering the individual an easy victim to serious constitutional troubles.

Cough.—Cough may be the result of some disturbance in the respiratory tract with or without expectoration, or it may be of reflex origin without any physical signs in the lungs.

A history of cough must be thoroughly investigated, its cause determined, and all facts clearly presented.

Diarrhœa, Chronic.—This may result from chronic intestinal indigestion, hepatic cirrhosis or occur without any appreciable cause.

Anæmia and emaciation will follow in time.

Carcinoma of the rectum may be mistaken for dysentery. The diagnosis is made clear by a digital examination.

Digestive System.—The diseases of the digestive system are of great concern and anxiety to the medical officers of a life insurance company.

The reason for this is evident from the fact that there are many diseases which cause passive congestion of the stomach, making the symptoms referable to this organ so prominent that we may be misled in our interpretation.

The expression of gastric symptoms as secondary to constitutional diseases must always stand out clearly and distinctly in the mind of the examiner, and he cannot have too strongly impressed on him the care he must exercise in the performance of his duty in this respect.

The peculiarity of the symptoms, as manifested in secondary gastric troubles, is their prominence only as the cause is active or quiescent. The symptoms do not continue or maintain their constancy with the same degree of uniformity as when they are associated with organic diseases. Therefore any history or admission of gastric trouble or " indigestion " should be minutely inquired into and its cause fully determined.

The excessive use of alcohol is one of the common factors and plays a prominent part in the causation of gastric trouble; again, it may be secondary to ulcer, cancer, diabetes, nephritis, gout, organic heart lesions, cirrhosis of the liver and tuberculosis: hence, since the symptoms referable to the stomach occupy such a prominent position in these formidable diseases, an

examiner is derelict in his duty if he does not satisfy himself fully as to the exact cause and associated conditions.

In this connection the large number of cases of cancer, occurring in men more frequently than women, especially after the age of forty-five, and in those who have an hereditary predisposition to this disease, should be remembered particularly.

During the incipient stage, sometimes lasting more than one year, the only symptoms are those of gastric dyspepsia. On this account, because of its latent character in many cases, we must guard against a too hasty conclusion and not attribute these symptoms to more trivial causes.

The neuroses of the stomach occur as a rule in persons of a nervous temperament or diathesis.

A disregard for hygienic rules, sometimes pelvic diseases in women, and floating kidney are common causes.

The visceral pains of locomotor-ataxia are often attributed to other causes, and this fact must be borne in mind.

Organic lesions and neuroses may co-exist, and for this reason prolonged observation is necessary in many cases.

All the general symptoms of neurasthenia, the idiosyncrasies and associations of the individual, must be considered, and at times it may be necessary to resort to the therapeutic test in order to render the diagnosis certain.

The prognosis in the neuroses when purely neurotic is generally good.

Drug Habits.— When a drug habit has been thoroughly established the diagnosis is easy, and very few would have the temerity to make application for insurance.

The province of the examiner is to apprehend these victims in the incipiency of the habit, and this in many instances is a difficult matter, for they are, without exception, consummate liars.

OPIUM.—Opium and its derivatives stand preeminently at the head of the list.

Few individuals are capable of taking opium for any length of time without presenting some symptoms, among the first being anorexia, followed by nutritional changes, which result in emaciation, often very rapid.

The contracted pupil, the stealthy glance and the nervous condition of the applicant, are the most prominent symptoms that tighten the meshes that prove him to be a habitue.

The prognosis is always bad, relapses are certain sooner or later, and a premature death follows.

CHLORAL.—This habit is much the same as opium, although its effects are not so rapid.

The circulation is affected early and is denoted by a weakened heart, dilatation of the capillaries, producing a flushed condition of the face and eyes.

The skin eruptions, due to a disturbed nutrition, present almost all varieties, the erythematous being the most frequent.

The mental state is characterized by apathy, confusion and uncertainty.

COCAINE.—The symptoms following the habitual use of this drug are confined mostly to the nervous

system—the individual is exultant, suspicious, and mistrustful; at times hallucinations predominate; pupils are dilated; pulse feeble and rapid; the health is impaired and the resistance to acute infections is low, recovery is prolonged, although the attacks may be mild.

Dyspnœa.—The chief causes of dyspnœa are diseases of the heart, lungs, and kidneys. (These conditions have been considered under the head Asthma.)

Dyspnœa following exertion may be ascribed to a weak heart, diseased blood vessels, emphysema, or incipient tuberculosis.

Generally considered, anything that prevents free ingress or egress of air in the lungs; anything that causes stasis of the pulmonary circulation; anything that causes pressure upwards from the abdomen, all limiting breathing capacity, will cause dyspnœa.

It occurs sometimes that no definite cause can be found for this discomfort, no evidence of any organic or local disease is manifested. In such cases it must be looked upon as a neurosis and is seen in those possessing a neurotic temperament or diathesis.

Ear, Discharge From.—Any discharge from the middle ear must receive special consideration in view of the fact that it may cause serious lesions of the brain membranes by extension of the process.

Always give a full history with date of attack, its duration, and if discharge has ceased, how long since its cessation.

Dr. Wendall C. Phillips (Med. Ex. and Pract., Feb., '05) gives his conclusions in reference to middle ear suppuration as follows:

"(1) Acute suppurative otitis media in an otherwise healthy person should not debar him as a safe risk beyond the time necessary for his recovery.

(2) Recurrent suppuration due to intra-nasal defects should not be delayed after a reasonable time subsequent to thorough operation.

(3) Continuous discharge with foul odor is indicative of a more or less extensive necrosis and persons afflicted with it are bad risks under all circumstances until a cure is effected by radical operation or local treatment.

(4) Larger perforations and apparent free discharge should not be considered a guarantee against extension of the necrotic process to deeper structures."

Emaciation.— Emaciation when rapid or progressive denotes a serious condition, and aside from acute diseases it is caused by defective nutrition, excessive tissue waste, cancer, chronic diarrhœa, drug habits, phthisis, aneurism, cirrhosis of the liver or kidneys, and diabetes.

These may be taken as the chief factors in its production.

A peculiar sallowness usually accompanies emaciation, and is an index for a searching investigation.

Epilepsy.—Grand Mal or true epilepsy does not offer any difficulty in its diagnosis.

A history of frequent falls, with loss of consciousness and scars on the tongue, establishes it beyond a doubt.

Petit Mal is the form in which the examiner is required to exercise his ingenuity, for these cases sooner or later grow worse until they are replaced by Grand Mal.

On account of the transitory loss of consciousness

and the slightness of the motor symptoms, it may entirely escape observation.

This form is noticeable first in a momentary loss of consciousness, a sudden cessation of whatever the individual may be doing and a resumption of it as if nothing had occurred, he alone being conscious of the fact that an attack had taken place.

As these attacks last only for a few seconds and may take place during the interrogation of an applicant, as a result of excitement, an examiner must be alert and quick to recognize and take advantage of these phenomena in these incipient cases.

Eruptions.— The skin reflects, in many instances, the constitutional condition of the applicant.

Many of the eruptions are merely local manifestations of a systemic disturbance.

One of the most frequent eruptions met with is eczema, which often is the result of some external agent, and may be intimately associated with the occupation followed by the individual.

Eruptions may be the result of a defective eliminative process, as exhibited in the gouty and rheumatic; they may be of toxic origin from intestinal disturbances; they may be associated with Bright's disease or diabetes, the degenerative changes affecting the skin as well as the viscera.

Psoriasis is frequently seen, and while its cause is not definitely established, it is probably more or less of a neurotic character. In fact, some individuals are said to have a psoriatic diathesis. It is, however, prone to relapse and is aggravated by dissipation.

Lupus and other tuberculous skin lesions must be

carefully considered, for they have a distinct relation to longevity.

In all conditions where the skin presents any eruptions, if their cause cannot be firmly established to be of external or parasitic origin, the internal organs must be thoroughly examined, and a satisfactory conclusion as to the etiology of the local manifestation rendered.

Fainting.—If syncope is recurrent or persistent it may be the result of organic disease or aneurism.

It is sometimes given as a cause to cover epileptic convulsions or seizures: hence we must not be too hasty in attributing it to a trivial cause or be misled in our judgment.

Fistula.—Fistula and tuberculosis or a tubercular history are so intimately associated that the examiner must be satisfied that the applicant is entirely free from any taint and the fistula entirely cured with the length of time.

Glands, Enlarged (see Neck, Chapter III, page 32).

Gout.—This disease must not be confused with rheumatism for it is entirely different in its sequela and prognosis.

We know that in gout we have a local manifestation of a constitutional trouble.

Heredity and habit play a most important part in its etiology; therefore we must investigate the family and personal history of the applicant, and, as this disease is a product of civilization, we must take into consideration the manner and mode of living with particular reference to the amount of malt beverages consumed.

The excess of uric acid circulating in the blood is

deposited in the joints, tendons and skin around or near the joints, tophi are found, and particularly in the helix of the ear.

An examination of the urine, heart, and blood vessels must be critical in every respect. It is here that the sclerotic changes occur that are progressive and ultimately destroy life.

Hæmophilia.—This is an hereditary diathesis and an ancestral history of the existence of this condition requires a careful inquiry as to its transmission to the applicant under examination.

Hæmoptysis.—A true hæmoptysis may be from disease of the lungs, heart, or blood vessels.

That occurring from the lungs indicates pulmonary tuberculosis in the vast majority of instances.

Those cases due to heart trouble are caused by obstruction from valvular diseases, and in mitral stenosis it is sometimes an early symptom.

Those cases due to the vascular system are caused, according to Butler, by the oozing of blood through the fibrinous layers of an aneurism or small openings from an aneurism.

Hæmatemesis may occur from gastric ulcer or carcinoma.

In all cases any premonitory or accompanying symptoms must be elicited, all circumstances connected with it must be investigated, and the medical officers presented with these facts.

Headache.—There are many conditions and diseases which cause headache or head pain.

The headache having for its chief characteristic chronicity is the one of most importance to the exam-

iner, and in all cases where this is known it is your duty to determine the seat of the pain, its duration, character, and frequency, and any accompanying symptoms.

One of the most frequent causes of headache is disorders of digestion and constipation.

The pain in these cases is referred to the frontal region and is of a throbbing character.

It is usually temporary and irregular in occurrence, is relieved by appropriate treatment and is not significant.

The anæmic headache is of a pressing type and is associated with other evidences of impoverished blood.

Renal or nephritic headache is of a dull throbbing character with vertigo. An examination of the urine will clear the diagnosis.

Ocular headache occurs after prolonged use of the eyes, is relieved by rest and is attended by pain in and around the eyes and sometimes conjunctivitis.

Neurasthenic headaches are constricting in character or vertical. They are worse in the morning and subside during the day.

Toxic headaches are due to drug addictions or the excessive use of alcohol.

Rheumatic and neuralgic headaches usually are in some manner connected with the occipito-cervical nerves. The pain is located in the posterior part of the head.

There are points of tenderness and movements of the head are painful.

Syphilitic headaches are produced by gumma and sometimes cause symptoms resembling brain tumors.

The pain is intense and persistent and usually worse at night.

The therapeutic test makes the diagnosis positive, and inquiry in this direction will enable you to make a clear presentation of the case.

Other forms of headache will be encountered, such as sympathetic, congestive, and lithæmic. The associated symptoms must be studied in order to render an accurate decision.

Hemorrhoids.—It is necessary in all cases to satisfy yourself as to whether the piles are external, internal or inflamed tags.

If they bleed state the amount of hemorrhage and if present at times other than when the bowels are constipated.

Differentiate as to the existence of fissure, prolapsed rectum and malignant disease.

Hernia.—When an applicant admits or it is discovered during an examination that he has a hernia, it is your duty to thoroughly satisfy yourself as to its exact nature, whether single or double, reducible or irreducible, if a properly fitting truss is worn continuously and without discomfort.

Ascertain if there is any evidence of strangulation in the past.

In hernia occupation plays an important role, because strangulation is more apt to occur in men following laborious occupations than in men of more sedentary habits, the occupation in some cases having a tendency to improve the risk.

Injuries and Surgical Operation.— A full and detailed report of severe injuries must be made relative

to their cause, duration and surgical interference or treatment and the supervention of any disease as a result.

Surgical operations require the same care in their delineation, with particular reference to the reason for such operations.

If the disease was of a malignant character its liability to return is more than problematical; in all such cases the remoteness and status in the interim must be carefully recorded.

In amputations the cause must be given, number, height at which such amputation was made, together with secondary surgical interference, if any, and the condition of the stump.

Jaundice.—This yellow or saffron tint of the skin and mucous membranes may be obstructive or toxæmic in its origin.

The first, as its name indicates, is due to some foreign body, gall stones being the most frequent, then to intestinal parasites entering the common duct in the duodenum; or it may arise from inspissated bile or mucus. Stenosis results from an ulcer of the duct or thickening from a catarrhal condition of the duodenum, pressure from tumors of the liver, stomach, or pancreas.

Toxæmic jaundice is caused by the toxines of any of the acute infectious diseases, acute yellow atrophy of the liver, Weil's disease, poisoning by snake venom, and certain drugs, copper, phosphorus, arsenic, and potassium chlorate.

In all cases the digestive system and the abdomen must receive careful scrutiny, the latter with refer-

ence to the liver and evidences of ascites and the presence of malignant tumors.

Muscular Development.—The development of the muscular system should be carefully studied, the tension and motor power of the muscles closely observed.

Atrophy, if present, may be due to a central lesion, a disease of the joint or the muscle itself.

Progressive muscular atrophy is very gradual in its development, the muscles of the hand, usually the right, according to Thompson, being the first to show signs; this wasting gives the hand a peculiar claw-like appearance and is accompanied by fibrillary twitchings.

Hypertrophy not due to continued and healthful exercise should receive the attention of the examiner and its cause given.

It may be due to Thomson's disease, which is usually hereditary, and may occur in successive generations.

Obesity.— It is difficult to decide what constitutes obesity, but as a rule any person weighing 25 to 50 per cent. above the normal standard may be said to be obese.

The factors entering mostly into the determination as to the propriety of the desirability of the risk are heredity and climate.

Oertel believes 50 per cent. of cases are hereditary, and in a warm climate there is less demand for the combustion of fat to maintain the body heat.

Temperament also has its influence; those of a phlegmatic temperament are more inclined to stoutness than those possessing a nervous temperament.

The association of gout, diabetes, and arterio-sclerosis with obesity must be borne in mind.

On the whole the objections to the obese are that they offer poor resistance to the acute diseases, and they are liable to chronic degenerative changes.

Œdema.—This is always a serious symptom, the causes giving rise to it being of a grave nature; only one form offers any deviation from this, and that is angio-neurotic œdema, having associated with it temporary digestive disorders.

As a rule œdemas are caused by anæmia, heart, kidney, and liver trouble.

Cardiac dropsy is the result of a deranged or enfeebled circulation, associated or not with valvular disease.

It is seen first in the feet and ankles, *i.e.*, the most dependent portion of the body.

Renal dropsy is first seen in the face or eyelids.

This form does not follow the law of gravitation, and an examination of the urine will show the presence of albumin.

In hepatic dropsy the peritoneal cavity is filled more or less with serum. This form must be differentiated from dropsy due to tumors causing pressure, and peritoneal inflammation.

Any striæ on the abdomen must be investigated, for they show conclusively a distension on a previous occasion, and, aside from pregnancy, are generally caused by dropsy or obesity.

Paralysis Agitans.—The recognition of this disease in its incipiency requires skill.

One of the earliest symptoms is the peculiar immobility of the face and almost utter lack of expression; another early symptom is a stiffness or more or

less rigid condition of all the muscles with contraction of the flexors, causing a characteristic attitude.

Tremor (pill rolling) is sometimes present in the beginning of the disease. It is more noticeable when the hand is at rest, ceasing on voluntary movements.

These are the chief symptoms in the earliest stages, and if any one is seen a further study of the case must be made to assure a positive diagnosis.

Pensions.—It is a seeming impropriety to entertain a proposition for life insurance on a man drawing a pension or having an application for one pending.

This paradoxical appearance, however, is not so great as would at first seem, for the man may be absolutely in sound health and insurable.

The basis on which the pension was granted or the application pending may have no bearing on the risk.

A pension for disability is an entirely different proposition.

Individual cases must be given in detail, all dates, causes, and circumstances are to be investigated and fully presented.

Physician, Family.—It is often a great comfort to the examiner and a pleasure to the medical director to submit a letter from the family physician in obscure cases for corroborative evidence or when an indefinite expression only can be obtained from an applicant either on account of ignorance or because of wilfulness as to past diseases and their present effect on his health.

This is of much value, particularly if the family physician has had the advantage of close contact for several generations and he is fully aware of the family

type, their susceptibilities and powers of resistance to diseases and dissipations.

It is always well to enlist the applicant's co-operation and secure his permission to communicate with the family physician for reasons that are obvious to the examiner.

Prostate.—Applicants suffering from prostatic diseases are not looked upon favorably.

As a rule this condition is not seen until after the applicant is fifty years of age, although it may occur in younger men.

Rectum.—An examination of the rectal and anal regions is often not as methodical and painstaking as it should be. The presence of fissure, hemorrhoids, ulcerations, fistula, and malignant tumors may be found, which are not only a bar to insurance, but will account for the anæmic condition usually found, and the cause of which the applicant is sometimes reluctant to admit.

Reflexes.—The cutaneous or superficial reflexes are not of much moment to the examiner; it is the tendon or deep reflexes of the lower extremities that are of the most importance.

The chief reflex from a clinical point is the knee-jerk; this is present in health almost without exception; therefore, its absence is of the utmost value and of equal value is its exaggeration.

Its absence is one of the earliest symptoms of loco-motor-ataxia, and for this reason is chiefly interesting inasmuch as the earliest lightening pains are usually [illegible] to other causes.

An exaggeration of the knee-jerk is seen in lateral

sclerosis or any disease of the pyramidal tracts above the first lumbar segment of the cord, except a total transverse lesion, in which case it is absent.

The next important reflex is the ankle-clonus. This is never present in health; therefore, when it is present, organic disease must be suspected on account of its extreme rarity in functional troubles. It is marked in lateral sclerosis, syringomyelia or transverse myelitis.

Rejection, Previous.—Experience will teach you that usually very little reliance can be placed in an applicant in reference to the question of his rejection by another company. His honesty at this point seems to have deserted him and his replies will be evasive or indefinite. He will not have any compunctions of conscience in his deliberate falsehoods.

This question should be satisfactorily and definitely answered, and the examiner should use his best endeavors to ascertain the truth and make him understand its importance.

If the fact of a previous rejection is admitted, the name of the company, together with the date of the rejection, and as far as possible the cause, must be given.

It may be that the reasons were based on false or inaccurate findings, or that the reasons at that time would be inoperable now.

Residence, Change of.—Most companies require an authoritative statement from the applicant as to a change of residence on account of health.

This is important to know and if a change has been made to learn whether for recuperation from an acute infection or from an actually existing malady.

It has been customary for many physicians to advise a change, at the same time not informing their patients of the true nature of the malady. In this manner a change has effected a cure, which in many instances means an arrested tuberculosis.

Rheumatism.—In the consideration of this disease you must always state the exact form in which it appeared in the applicant, the number, severity, duration, and dates of each attack, if more than one, also any later tendency to it.

A very careful examination of the heart must be made, and if endocardial trouble is found give full particulars as to whether the applicant suffers from palpitation, dyspnœa, or œdema.

It is always well to remember the role heredity plays in this disease and particular attention must be given to the family history.

In a person who has had rheumatism, it is advisable to give a clear statement as to the prophylaxis practiced.

Sanitary Surroundings.—Aside from occupation the sanitary condition of the residence and premises should be considered, even the section of the city (provided the applicant resides in a city) must be estimated as to its healthfulness.

It may not be beyond the province of the examiner to keep his company informed as to any temporary, unusual, or special unsanitary condition of your city or vicinity.

Sclerosis-Arterio.—This disease may be looked for in applicants over fifty years of age, those addicted to alcohol, the gouty, the syphilitic, in those burdened with hard and prolonged physical labor, and in the "high livers."

Inspection and palpation enables the examiner to recognize the disease early by the enlargement of the smaller arteries (particularly the temporal) and their tortuosity, which cannot be seen in health.

The pulse has a leathery feel and cannot be obliterated by compression. The vessel feels full, or it may feel uneven and knotty from the calcareous deposits.

When the disease has advanced, the classical symptoms are found: high pulse, thickened arteries, cardiac hypertrophy and accentuation of the aortic second sound.

The process is slow and it may be years before all of these symptoms are manifested; therefore it is of the utmost importance to detect it in its earliest stages.

If the disease is confined to the aorta alone, a general weakness of the muscles is in evidence with a disturbed condition of the circulation.

If confined to the coronary arteries, frequent attacks of angina following exertion is the chief symptom.

Stricture.— This is a result of gonorrhœal infection in the past and until its complete cure an applicant could not be accepted, because of the conditions of the bladder and kidneys, which may arise from this obstruction.

If a stricture is reported to have been cured give date, mode of treatment and present condition.

Syphilis.— The ultimate effects of this disease on the economy are far reaching, and while the fatalities of the disease per se are small, the reducing effect it has on the whole system, the associated condition and malnutrition connected therewith are the factors which contribute to its importance.

It must be determined first that the disease actually existed, and then a careful interrogation as to the activity and persistency of treatment instituted.

The date of the initial sore must be known, the existence of secondary symptoms with the nature and character of treatment.

The tertiary lesions are slow and chiefly exhibited in the circulatory and nervous symptoms.

Dr. J. Nevin Hyde sums up his conclusions as follows: "The ideal applicant for life insurance who has suffered from syphilis, should have had active and unmistakable symptoms of that disease early in life, and should have had after efficient treatment several years of exemption from all evidences of infection; should have had an excellent family history, free in particular from instances of nervous diseases affecting immediate relatives, and should be leading and have led a life relatively free from strain, stress, and excess of all kinds, including indulgences in alcohol, tobacco, or other narcotico-stimulant."

Temperature.—The normal temperature as determined by physiologists can be accepted to be 98.6 F., with a variation of .5 as a maximum in health.

Many elements enter into the physiologic variation, chief of which are exercise, food, and drink.

It is also well to remember the diurnal variations, it being higher in the evening.

When taking the temperature by the mouth neither very hot nor very cold drinks should be taken for half an hour before.

If the temperature at the time of taking is above or below the physiologic variation, it must be taken again,

and at a different time of the day. If it is then found to exceed the normal variation and the pulse accelerated, it is a prognostic sign of much value.

It is frequently the earliest sign of incipient tuberculosis and present before physical signs are manifest.

Tobacco.— Sufficient data have not yet been gathered to deduce conclusions, but the fact nevertheless stands out prominently that such a powerful agent as tobacco must have a profound effect on the nervous system, and while it does not affect all alike, and what would be too much for one person is moderation for another, it remains for you to determine.

We must ascertain if it makes an applicant nervous, causes tremor, insomnia, or palpitation.

Tremor.—The presence of tremor is indicative of some pathological process in the vast majority of cases in which it is seen.

A temporary tremor exists normally in nervous individuals, particularly so when under any excitement; this is seen during life insurance examinations in persons of meagre educations and those unaccustomed to writing.

These forms are unimportant and have no diagnostic value.

Intentional tremor concerns the examiner because of its association with organic disease.

The inability of a person to perform any act requiring co-ordination of muscles, thus producing violent movements and tremor (the act of buttoning a collar or coat) is one of the prominent symptoms of disseminated sclerosis.

Tremor is observed in alcoholism, the excessive use

of tea, coffee, or tobacco, lead poisoning, paralysis agitans, and hystero epilepsy.

Fibrillary tremor is prominently identified with progressive muscular atrophy.

Tuberculosis.—All insurance companies put forth every effort to exclude tubercular applicants in whatever form the disease is manifested.

Notwithstanding all precautionary measures the mortality from this disease is high, and it is because of the almost universal exposure to this disease that the examiner must be diligent in his work and detect this disease in its incipiency.

It is because of the personal and ancestral predisposition to this disease that such a large number of questions is incorporated in the blank having reference to the digestive and the respiratory systems, adenitis, loss of weight and change of residence.

The admission of any of these suggests tuberculosis, and once a clue is obtained it must be exhaustively dealt with and its cause established.

It is the predisposition that is intensely interesting to the examiner, the lack of ability to resist the natural invasion of the disease, which to a person not possessing this peculiarly favorable soil renders him comparatively immune.

Dr. T. G. Allen (Exam. and Pract., Jan., '04) is of the opinion that environment is more important, and renders the following opinion: "More important to my mind is the question of environment. Full particulars as to the closeness of contact with the consumptive in the same house and as to the personal habits of both consumptive and applicant should be obtained in

order to arrive at a just estimate as to how you should classify the applicant as a risk."

It is the undeveloped and immature symptoms that are of the greatest importance, and the examiner must use his ability and medical knowledge to recognize them.

Dr. C. H. Harbaugh in a paper on Diagnosis of Incipient Pulmonary Tuberculosis by signs that cannot be concealed by the applicant, calls particular attention to the following points:

"One of the first and most important signs that stands clearly before our eyes is the dilated pupils; even in the presence of a bright light reaction is slow, and they resume almost immediately their former dilatation.

"This sign is not always present, but when it does exist corroborative evidence must be carefully looked for.

"The pulse is a most valuable index in the early diagnosis of this disease. It is always accelerated and frequently of lowered tension, posture having no effect on it.

"The third most important sign is the temperature; it may be elevated or sub-normal."

The examination of the chest and lungs must be conducted in a thorough manner; all deformities of the chest have a predisposing influence by restricting the lung capacity and breathing power. A physical examination enables the physician to note any unequal expansion, contraction, retraction, modification of Litten's diaphragm sign or dulness, which means early Consolidation. Quoting from Dr. Harbaugh:

"As auscultation is the most important method on

which the examiner must rely, it must be remembered that the normal inspiratory and expiratory sounds stand in ratio as ten to two in regard to length and that the pitch of the latter is lower than that of the former; therefore when the expiratory sound is found increased in length and the pitch raised there is trouble somewhere, and the trouble generally means a beginning tubercular condition.

"This is one of the most important signs, and when combined with enfeebled breath sounds on inspiration and a slightly roughened harsh and prolonged expiratory murmur almost always indicates a tubercular condition existing in the incipient stage.

"Increased vocal resonance in any part of the lung (except over the right infra-clavicular and above the right scapula) is sufficient cause for investigation.

"Sometimes an examiner is fortunate enough to get his ear directly over a small spot of infection; consequently he hears the small crackling rales at the end of inspiration; an absolute sign of the disease as they are generally present before tubercle bacilli are found in the sputum."

When a predisposition or a suspicion of it exists, a careful inquiry as to past diseases must be made, for in themselves the tendency is to render the person prone to its inception.

So many factors and associated conditions enter into the prognosis and expectation of life in those having a predisposition that the fullest possible history, both personal and family, together with all external circumstances, must be presented in order that a proper disposition of the case can be made.

Tumors.— Tumors are viewed by the medical officers of a company with great conservation.

The character must be definitely known and all circumstances clearly presented.

Any tumor with a history of malignancy, although surgical interference may have removed apparently the prospect of a recurrence, is looked upon unfavorably.

Ulcers.— As a rule the laity classify all sores as ulcers without reference to their origin or cause, whereas to the medical mind their significance depends entirely on the cause.

They may depend on a tubercular process, syphilis, varicose veins, or necrosis.

It is necessary in each case to give the location, duration and cause, and, if healed, the length of time.

Urination, Difficult or Frequent.—Difficult urination is caused by any condition which reduced the lumen of the urethra, such as stricture, prostatic enlargement, or it may be due to a loss of muscular tone of the bladder.

Frequent or painful urination is important inasmuch as the cause must be known. It may be due to an abnormality of the urine or disease of the bladder, cystitis being the most frequent cause.

It should be remembered that the quantity passed during the day is about four times greater than at night. If a person gives a history of having to rise during the night and attributes it to habit, the examiner should not attach too much faith to his statements, for more often it is due, aside from a temporary excessive acidity, to cystitis, diabetes, ulcerations, or growths in

the bladder, calculi, prostatic enlargement, or inflammation.

Any history of an abnormality connected with the bladder requires a full statement of all the facts, its cause, duration, and present condition.

Vaccination.—Vaccination or a release from all responsibility on the part of the company in the event of death from variola, should be the rule.

In all cases the date of the last successful vaccination should be recorded with inspection of the scar.

Varicose Veins.—The legs should be examined for varicose veins, and their cause given so far as possible.

They may be due to long standing, abdominal tumors, pregnancy, or anything which interferes with the return of the blood.

The presence of ulcers or scars should be reported, and whether or not support is worn.

Vertigo.—Vertigo is a symptom of a large number of diseases and disorders.

Probably the most frequent cause is gastric disturbances. This form is transient in character and relief is obtained after vomiting or the action of a cathartic.

Lithæmia will rank next as a causative agent, and since this is amenable to treatment and easily removed, a postponement should be recommended.

Vertigo, however, may have for its cause more serious diseases, such as, arterio-sclerosis, aneurism, Meniere's disease, cerebellar affections, and oftentimes the minor forms of epilepsy are mistaken for a simple vertigo.

The prognosis, of course, will depend on the cause in such cases.

The frequent recurrence of the attacks is the most important point to remember, and if such is found to be the case a thorough examination to determine the cause is imperative, because it denotes an impairment worthy of serious consideration.

Weight.—In an individual of average height and weight there can be an approximation near enough for all practical purposes, but it is of the utmost importance to be absolutely accurate, to measure and weigh the applicant yourself, when there is a near approach to the limit, for the light weights and heavy weights die far short of the expectancy of individuals of their age having a normal weight.

As a rule all companies will grant insurance to persons not more than 20 per cent. above or below normal.

In excess of this it is your duty to present a clear intelligible report covering all facts as to the family history, habits, condition of the lungs, heart, vessels, or kidneys.

Light weights may attribute their peculiarity to a family characteristic, which in some cases is true, but if an investigation is made you will usually find that this is a misconception and the evidence is too superficial to be of value, for it is more often found to be the result of a constitutional trouble, either hereditary or acquired.

As a class they are poor risks because of their temperament (nervous) and their liability to nervous diseases and tuberculosis.

The extenuating circumstances according to Dr. C. L. Green are as follows: "If the underweight have a well developed and freely expanding chest, if

his health record be good, his family members long lived and free from tuberculosis, and particularly if light weight is a family trait, he may be accepted at ordinary rates, even if he run 20 per cent below the tabular weight.

If on the other hand these favorable features are lacking, he cannot be given so much latitude."

The overweights are poor risks. They are lethargic, their habits in regard to eating and drinking are bad, their excesses in general are usually extreme, they are particularly liable to diseases of the heart, vessels, and kidneys.

In all cases where the gain or loss of weight has been recent and rapid you must give full particulars. Acute illness, laborious work, grief, confinement indoors, change of occupation, all contribute to the effective understanding of this problem.

Dwarfs, giants, athletes, and professional strong men are poor risks.

The table of height and weight given on page 187 has been adopted by the Association of Life Insurance Medical Directors.

Women, Examination of.—The examination of women should be conducted in the same candid and thorough manner you would exercise in the examination of men.

Any and all embarrassment is easily overcome and the woman is at once placed at her ease and usual composure by the examiner if he uses the tact and ability acquired in his profession.

The diseases of the pelvic organs and the breast are those to which the examiner must give special attention.

Any disorder of menstruation must be carefully inquired into and recorded, the number of children and date of birth of the last, and the occurrences of any miscarriages with the dates, the existence of pregnancy with the period of gestation, all must be given.

NORMAL HEIGHT AND WEIGHT.

Height	Ages								
	15–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64
5 ft. 0	120	125	128	131	133	134	134	134	131
1	122	126	129	131	134	136	136	136	134
2	124	128	131	133	136	138	138	138	137
3	127	131	134	136	139	141	141	141	140
4	131	135	138	140	143	144	145	145	144
5	134	138	141	143	146	147	149	149	148
6	138	142	145	147	150	151	153	153	153
7	142	147	150	152	155	156	158	158	158
8	146	151	154	157	160	161	163	163	163
9	150	155	159	162	165	166	167	168	168
10	154	159	164	167	170	171	172	173	174
11	159	164	169	173	175	177	177	178	180
6 ft. 0	165	170	175	179	180	183	182	183	185
1	170	177	181	185	186	189	188	189	189
2	176	184	188	192	194	196	194	194	192
3	181	190	195	200	203	204	201	198	

If the climacteric has been passed, the length of time since the cessation of menstruation with any special incidents connected therewith.

The breasts should be examined for tumors. If any growths have been removed, state character and length of time elapsed since the operation and present condition.

The physical examination must be made with the corset removed and all clothing loose, the chest measurements taken with the tape under the axilla, and

the waist measurement at the waist line. If the abdomen is large also measure at the maximum point, and state if the pendulosity is due to omental fat, the presence of a tumor or ascites.

Addenda.— THE NERVOUS SYSTEM. — A brief thought on the nervous system renders it necessary for us to take into consideration the person's temperament.

The classification of the older writers has not been improved to any appreciable extent and this adopted nomenclature serves as a means to express our impressions understandingly.

By the nervous temperament we know that the nervous system is sensitive and that this element predominates and all phenomena connected with the brain are stimulated to greater activity.

Phlegmatic means slow, not energetic, the brain reactions are slow and bodily ills are born with comparative ease.

The sanguine temperament is seen in well developed muscular men with full pulse, all indicating full blood supply and habit. The chief characteristic of the possessor of this temperament is irritability.

INTELLECTION.—The acuteness of the memory and the power to recall past occurrences and carry on a logical train of thought, with the power to appreciate the logical sequence of facts and ideas, is of importance, for a deficiency in these is the premonitory symptom and the first to show as evidence of impaired or failing mental health.

These are especially seen in epilepsy and incipient insanity.

MENTAL HEALTH.—It is of the utmost importance

to detect any mental disease in its incipiency, even before a sufficient time has elapsed to produce changes in the physical condition.

The general paretic can be recognized by the prodromal signs (remembering that in many instances a syphilitic history predisposes), which are irritability, faulty judgment in every-day affairs, deterioration of his moral sense, extravagant and grandiose ideas, and the desire to impress those about him with his own importance, disorders of speech, intention tremor and the Argyll-Robertson pupil.

All of these are early symptoms and form a clinical picture that is well worth having impressed on your mind.

Melancholia, on the other hand, is characterized by great depression, the attitude and the expression of the face presents a sad and sorrowful picture, the portrayal of despondency; the individual seems to be utterly and hopelessly defeated in all of his undertakings and bowed down by imaginary woes that overtake him.

The burden of life to him in this mental state is for him to make restitution and work out his own salvation.

These two conditions constitute the majority of cases an examiner will encounter, and careful thought and observation may save him humiliation and perhaps his reputation with the company.

THE EXAMINER'S RECOMMENDATION.—The medical director reviews the application and the examiner the applicant, and it is right that the examiner should be required to deliver an opinion as to whether he

considers the applicant a first-class, fair only, or a poor risk.

His recommendation should be based on his entire knowledge of the applicant as elicited by his examination, including the personal, family and medical history, physical condition, occupation, and all external circumstances.

He must be conscientious and absolutely honest in this opinion. He should not make a recommendation that he would not be willing to assume personally, and in all cases not considered first-class he should state fully his reasons for the lower rating.

CHAPTER XII

THE INSURANCE OF SUBSTANDARD LIVES

Introduction.— Actuarial computations have determined with rare accuracy the number of deaths that will occur each year in a group of men of a given age.

An analysis of these computations will show that some will live to their expectancy, some will fall short of it, while others will exceed it.

It is from these calculations that tables and ratings are made for the use of the insurance companies.

The average good life will reach the mean expectancy or exceed it.

If, on the other hand, an individual has some organic disease or for other reasons is unsound, he is not an average good life, and is therefore below standard, and while the disease itself will probably not materially hasten his death under ordinary circumstances, yet it is only rational to assume that he will not live out the expectancy of an average good life, because of the inroads and encroachments other and incidental diseases would make on his weakened resisting powers; these same diseases would have little or no effect on another whose constitution was strong and vigorous.

Therefore, we may define a substandard life as one under the normal healthy life, and one that would not reasonably be expected to reach the average age of men of his group possessing a sound body and constitution.

The fulfillment of the utilitarian conception of the aim of life insurance is not accomplished until some form of protection is offered to the families of those who are unfortunate in being the possessors of an unsound or impaired body.

The manner in which this problem can be solved in order to make it fair and equitable to all who seek this protection, is a subject to which medical directors and actuaries have given very earnest and sincere thought.

If we were able to approximate the length of life, with a degree of certainty, in each individual case presented to us that has some impairment, a solution would be an easy matter. But this is as utterly impossible as it is for us to foretell with certainty the length of time a healthy man will live.

Inasmuch as it is equally difficult to render a decision in either case, whether the individual is sound or unsound, the whole subject resolves itself into one of prognosis, and it seems that the only just and equitable manner is to arrive at conclusions on the basis of actuarial accuracy.

A careful classification of all impairments, with reference to similarity and degree, including the innumerable factors and modifying influences associated with the different classes could be made, and a table, elaborate and comprehensive, could be formulated, which would eliminate to a large extent the element of risk, unprofitable not only to the company but also to the insurer.

This is now the practice adopted by the different

companies, and while statistics are available only for very recent years, yet with the care and accuracy that is now exercised in their compilation, the statistics each succeeding year will enhance their value, and in time a most inclusive record of all degrees of impairment will be available.

An arduous task confronts an examiner in the very beginning of his labors, and in order to clearly present and estimate the degree of impairment present, he must face difficulties and conditions that will call for the exercise of all the refinements of diagnostic skill with which he is endowed.

It is in this ultimate presentation of these cases that the personality of the examiner enters so largely, for after all, these cases must be judged individually, and the examiner's ability to properly recognize the impairment, by the finer shadings of diagnosis and his judgment of the probable effect on the after-life of the applicant, are desirable qualities.

Sources of Limitations:

(1) Family history.
(2) Personal history; past illnesses with tendency to recurrence.
(3) Occupation, moral hazard, and environment.
(4) Under-weight; over-weight.
(5) Organic diseases:
    Heart lesions
    Albuminuria
    Asthma
    Glycosuria
    Syphilis
    Tuberculosis.
(6) Sex.

General Classification.—In reference to the general classification of impaired lives, Dr. Charles L. Green offers the following:

"(1) Those in which the risk increases with the lapse of years—"increasing hazards."

"(2) Those in which the risk diminishes with the lapse of years—"decreasing hazards."

"(3) Those in which the added risk is a constant factor—"permanent hazards," and presents the following as illustrations:

"A young man whose parents have died of phthisis the risk assumed diminishes with the aging of the policy.

"In the case of a young man whose family members die of apoplexy, there is, on the other hand, an increasing risk as the policy grows older.

"In occupation may be found an example of permanent hazard."

In approaching the consideration of the details of the sources of limitation, it is a difficult matter to isolate one and consider it from its various view points for the reason that they are all more or less interdependent, or at least have some mutual relationship.

Family History.—It seems proper, however, to direct attention to the family history first, and its precedence is due to the fact that the stamp of the progenitors is so strong and well marked in many instances that a certain destiny of tissue formation is so indelibly imprinted and inborn in the individual that the family proclivities stand out clearly and prominently, either in their strength or weakness. If the latter prevails, a large favorable personal equation must be present in order to overcome the unfavorable

influences the family history may have on the life.

The family history must be exhaustive and accurate to be of benefit, and from it we learn to approximate the duration of life of individual members of a particular family, whether short-lived or long-lived, together with their proneness to special diseases and degenerations (see Heredity).

Personal History.—The personal history influences our decision in many instances.

This has reference, particularly, to past illnesses, because of the untoward after effect certain diseases have on the economy, and the secondary manifestations that follow some constitutional diseases, notably those of the heart, lungs, and kidneys.

The personal habits must be fully known, and any excesses must be detailed, for they certainly will prove deleterious to longevity, and will usher in an important factor for consideration.

Occupation, Moral Hazard and Environment.—These can with propriety be studied together, for their reciprocal relations are well understood.

The true and definite nature of the occupation must be known because of the added element of risk associated with some, and aside from the specially extra-hazardous risk connected with some occupations, which are recognized as prohibited callings, the following table illustrates the relation of occupation to longevity.

(This table was presented by Dr. J. M. French in a paper on Occupation in Relation to Longevity,* and is for the whole State of Massachusetts, covering a period of 43 years and 8 months.)

* (Med. Examiner and Practitioner, January, 1904.)

Occupations	Number of Persons	Aggregate	Average
All classes of occupations	238,792	12,387,499	51.87
(1) Cultivators of the earth	47,511	3,153,456	66.37
(2) Active mechanics abroad	18,042	983,568	54.52
(3) Active mechanics in shops...	29,501	1,440,908	48.84
(4) Inactive mechanics in shops .	29,577	1,346,883	45.54
(5) Laborers, no special trade ...	45,428	2,234,249	49.18
(6) Factors laboring abroad	11,216	444,661	39.65
(7) Employed on the Ocean	12,722	660,026	48.74
(8) Merchants, financiers, agents.	28,351	1,407,442	49.64
(9) Professional men.....	8,627	449,981	52.16
(10) Females.....	7,819	306,346	39.18

The conclusions of Dr. French are: "(1) As a general rule, those occupations are most favorable to longevity which require a life spent largely in the open air, and which furnish abundant exercise and harmonious development for both body and mind; which do not call for over work, too many hours of labor, or work under conditions unfavorable to health; which do not involve worry of mind or loss of sleep; which foster a reasonable degree of independence, and are sufficiently remunerative to allow those engaged in them to enjoy the comforts of life.

"(2) On the other hand, those employments are most destructive to health and longevity which involve constant confinement indoors, with little exercise or with exercise of special muscles or sets of muscles only, in vitiated air, exposed to the inhalation of irritating dust, foul vapors, and poisonous gases; and which do not furnish a fund of interest to give zest to life, and lead to efforts to excel.

'(3) The mind is a more important element in longevity than has usually been considered.

"An active brain and a strong will enable a man to endure many ills and survive many illnesses which would otherwise prove fatal. A cultivated mind increases a man's resources many fold, as well as his motives for holding on to life. A knowledge of the laws of life gives him the power to prevent disease and recover from sickness; and even beyond this, there seems to be something in the life of intellectual activity which favors length of days."

The moral hazard is the most difficult of all to estimate, for so many factors enter into the completeness of this phase of life insurance that it is impossible to group them for statistical study, and therefore each case must be considered individually.

The ability to earn a livelihood, the possession of a visible means of support from a legitimate business source, minimizes the chance of the individual becoming a public charge, and materially favors his prospects of a long life because of its conduciveness to health and because it is one of the necessary essentials for the proper maintenance of mind and body.

The marital relations, manifestly, have a deleterious effect on the applicant when they are unsatisfactory. Marital infelicity usually predisposes to alcoholic and venereal excesses.

Dr. Augustus S. Knight summarizes the moral hazard estimate as follows: "Everyone knows that people of notoriously bad habits and those whose occupations are such as to suggest immoral living are exceedingly short-lived. Those connected with the

liquor business are well considered undesirable, their mortality being about double that of the expected; they drink to excess, take little exercise, and are apt to be over-weight.

"Deaths among them are to an astonishing extent due to diseases which are caused or made worse by alcohol.

"Even the occasional bartenders, who have never drank or used tobacco, have yet proved to be unprofitable risks, because evidently their constant temptation, their association with saloon men and with the high-livers induce habits that cut short their careers."

Under Weight and Over Weight.—Light weights are poor risks because of their liability to nervous diseases and tuberculosis.

Heavy weights are undesirable risks because of their liability to diseases of the heart, vessels, and kidneys (see Weight).

The following table represents the experience of the Connecticut Mutual Life Insurance Company, covering a period of 49 years, as presented by Dr. C. L. Green:

Class	Under weight	Over weight
Tuberculosis	22. %	1.9%
Rheumatism and gout	1.1%	2.2%
Diabetes	0. %	3.5%
Nervous diseases	14. %	23. %
Heart disease	6. %	15.5%
All circulatory diseases	7.8%	17.9%
Pneumonia	12. %	6.5%
All respiratory diseases	16.4%	9. %
Digestive diseases	7.5%	8.5%
Kidney diseases	5.2%	9.7%

Heart Lesion.—Endocarditis comprises the greatest number, by far, in the category of diseases admitted to the substandard class, and in recognition of this fact it is particularly desirable to have all the data and contributory evidence in each case as full and comprehensive as possible.

The relative frequency of valvular defects according to Loomis is as follows:

(1) Mitral regurgitation
(2) Aortic obstruction
(3) Aortic regurgitation
(4) Mitral obstruction
(5) Tricuspid regurgitation
(6) Tricuspid obstruction
(7) Pulmonary obstruction
(8) Pulmonary regurgitation.

Green quotes Sperling's figures taken from the statistics of the Berlin Pathological Institute:

"Number of cases:

Three hundred cases of endocarditis in the years 1868–'70:

268 cases—89 per cent.; left side of the heart affected.
3 cases— 1 per cent.; right side of the heart affected.
29 cases—10 per cent.; both sides of the heart affected.

Total, 300

Affection of one valve only .....200 cases—66.7 per cent.;
Of which:
Mitral valve only .....157 cases—78.5 per cent.;
Aortic valves only..... 40 cases—20. per cent.;
Tricuspid valve only..... 3 cases— 1.5 per cent.;
Pulmonary valves only ..... 0 cases— 0. per cent.;

Combined valvular lesions.....100 cases—33.3 per cent.;
Of which:
Mitral and aortic..... 71 cases—71. per cent.;
Mitral and tricuspid..... 9 cases— 9. per cent.;
Mitral and pulmonary..... 2 cases— 2. per cent.;
Aortic and pulmonary..... 1 case — 1. per cent.;
Aortic and triscupid..... 0 cases— 0. per cent.;
Mitral, aortic and tricuspid..... 16 cases—16. per cent.;
Mitral, aortic and pulmonary.... 0 cases— 0. per cent.;
Tricuspid, pulmonary and mitral. 0 cases— 0. per cent.;
Tricuspid, pulmonary and aortic. 0 cases— 0. per cent.;
All four valves ..... 1 case — 1. per cent.

The acceptability of an individual, whose life is impaired by some form of valvular defect, depends to a greater extent on the extenuating circumstances surrounding each case than it does, with one exception (aortic insufficiency), on the particular valve or valves affected.

In these cases the age, physical structure or distinguishing personal characteristics, sex, age of lesion, habits, family history, personal history, occupation, and environment of the individual constitute the elements upon which prognosis is based.

Therefore since the limitations are thus adjusted, it is proper to consider these essential features in detail.

The classification of the valvular defects with reference to their severity and gravity, according to Broadbent and accepted by other writers, is as follows: Aortic regurgitation, mitral stenosis, aortic stenosis, mitral regurgitation.

The most important single factor to be considered is compensation, and it can be stated positively that no case is insurable unless compensation is perfect.

Therefore, what may be termed as the first grade of sub-standard cases of this class are those who have a good appearance, good health, habits and occupation, with compensation perfect—which means, without signs of palpitation, dyspnœa, pain in the region of the heart or dropsy. These signs we denote as terminal symptoms, and they foreshadow the end in, at most, a few years.

The physical structure or the distinguishing characteristics of the applicant should be such as to at once convey the idea of good health from external appear-

ances. The muscular system, the cutaneous system, the digestive system, the secretive and excretive systems must all fulfill their respective functions properly; otherwise the prognosis would be unfavorably affected.

From puberty to middle life valvular lesions are borne with comparative ease; after this, the arterial changes due to advancing years introduce a complication which is most serious.

Females bear valvular diseases better than males for the reason that their environment, as a rule, predisposes to a life of ease and quietude.

The determination of the length of time a lesion has existed is often difficult, for the reason that its existence is frequently known for the first time when the applicant presents himself for examination.

Our resources, then, are limited to the approximation of the age of the lesion from the medical history of the applicant, bearing in mind the diseases to which valvular lesions are likely to be secondary.

Individuals, whose habits are known to be bad, must be considered as unfavorable, for the reason that excesses of all kinds will undermine the system in general, and in the presence of an impairment this deterioration will progress more surely and rapidly.

The family history should be free from hereditary tendencies to arterial changes and degenerations.

The personal history should not only be free from those diseases which act as causative factors in the production of heart lesions, but also free from those diseases known to have a tendency to recurrence, such as, rheumatism, syphilis, and gout.

The occupation and the surroundings, which from

their nature entail hard work or exposure, whether from a physical or mental standpoint, are productive of a condition resulting from the expenditure of a large amount of energy. This has an unfavorable influence on the prognosis.

Albuminuria.—The presence in the urine of serum-albumin or serum-globulin is known as albuminuria, and must always be regarded as pathological, whether temporary or permanent.

Much has been written on this subject and the literature is overflowing with conflicting opinions of equally eminent authorities, and at the present time no definite and exact rules can be laid down stating positively which cases shall be accepted and which shall be rejected.

An examiner can assist the medical director materially by his attention to detail and his presentation of the case.

These necessary data, with which the medical department must be familiar before any disposition of a case can be made, have been arranged in a most practical form by Dr. Brandreth Symonds in his excellent work on Life Insurance Examinations.

"(1) The longer the albuminuria persists, the greater is the probability of its organic origin.

"If it has lasted for more than a year, the prospect of its disappearance is doubtful, but not hopeless even then.

"(2) A continuous albuminuria is of more serious import than one which comes and goes.

"(3) The presence of tube-casts is usually looked upon as indicative of an organic renal trouble.

" The presence of red blood cells, if it can be demonstrated that they are from the kidneys, is quite conclusive of organic changes there.

" Some observers claim that they can differentiate renal epithelial cells with certainty from those of the bladder and uterus, but most of us cannot.

" (4) The persistence of a specific gravity lower than 1015 is a bad prognostic in any case of albuminuria. It is apt to indicate renal insufficiency, and these cases are much less amenable to treatment than those in which we find the specific gravity 1025 or higher. If we further demonstrate renal insufficiency by determining that the amount of urea excreted is less than normal, the indication, of course, is still more serious.

" (5) A hard pulse with an accentuated sound of closure of the aortic valves is distinctly prejudicial. An increased arterial tension is thus shown, which may indicate the beginning of arterio-capillary fibrosis, or which may be due to the stimulation and consequent narrowing of the arterioles by blood from which the irritant excrementitious products have not been properly removed. In either case the sign is a bad one, as it points to something more than a functional disturbance.

" (6) Headaches must be regarded in this connection as an evil omen, if they are at all frequent or severe.

" (7) The age of the patient is a point of much consequence.

" The younger the case down to childhood, the more apt it is to be functional, and the better the chances of speedy and complete recovery.

"If the age is over forty, these prospects are much dimmed, and such cases should be regarded with suspicion.

"(8) Extremes of weight, both high and low, are prejudicial in albuminuria, as in most other diseased conditions.

"We are apt to find light weight associated with albuminuria of the young, and in many of these cases it seems to be due to the latter.

"On the other hand, over-weight with albuminuria is apt to occur in persons over thirty, and is of graver significance than under-weight, as the same causes which have produced the obesity have probably also occasioned organic changes in the kidneys.

"(9) The use of alcoholics beyond the most moderate extent is unfavorable in cases of albuminuria. Certainly, if the amount taken is in the neighborhood of Anstie's limit, or if there are occasional excesses, the prospects are not good for the ultimate disappearance of the albumin."

After this entire survey of the case by the examiner has been made and all information is secured, the rules as suggested by Dr. William B. Davis for the acceptance of applicants in the sub-standard class have the approval of most medical directors. They are as follows:

"(1) There should be nothing in the family history indicative of heredity of Bright's disease, and there should be no symptom of renal disease in the personal history except albuminuria.

"(2) The candidate should be under forty years of age, in good health, and there should be no history

of gout, rheumatism, syphilis, lead-poisoning, nephritis, intemperance, chronic dyspepsia, or dropsy.

" (3) There should be no indication of hypertrophy of heart or increased arterial tension, no accentuation of the aortic second sound, and no palpitation or dyspnœa.

" (4) There should be no retinal changes.

" (5) The color, density and quantity of the twenty-four hour urine should be normal, or it may be darker in color and heavier in density.

" (6) The specific gravity of the twenty-four hour urine should not be below 1020. It may range from 1015 to 1030.

" (7) The precipitated albumin should not exceed one-eighth (⅛) of the urine.

" (8) There should be a period of the twenty-four hours when the urine is free from albumin.

" (9) The urine, as a rule, should contain no tube-casts.

" When, however, the specific gravity and quantity of urine are normal, the presence of a few hyaline casts has no serious import."

Asthma.— In estimating the effects of asthma on the after life of an individual, the cardinal point to be considered is the cause. In some instances it is a pure neurosis with a tendency toward a reduction in the frequency and severity of the attacks. These cases are regarded as the most favorable, while in others the causes are of the most serious nature, depending for their origin on a lesion of the heart, kidneys, or some organic disease of the lungs. This affects the prognosis in proportion to the gravity of the origin.

Asthmatics, as a class, fall short of the expectancy of average healthy lives about one-half. Therefore they cannot be accepted in any case at first-class rates, but must always have an extra added, for the reason that eventually these cases terminate in some bronchial affection, as emphysema or chronic bronchitis, or from continued interference with the pulmonary circulation, a dilatation of the heart is likely to supervene.

A long quiescent period or a marked reduction in the frequency and severity of the attacks, a family history free from an hereditary tendency to asthma and tuberculosis, a good cardio-vascular system, a healthful occupation and the knowledge of the fact that it is not associated with or dependent on any organic affection, are the only conditions on which an asthmatic is considered and as being entitled to some form of insurance.

Glycosuria.—By this term is meant the presence of glucose in the urine. This may be temporary, is the result of dietetic conditions, and occurs after the ingestion of large amounts of sugars and starches. It occurs also during pregnancy and during convalescence from acute febrile maladies, and in stout persons.

Persistent glycosuria means diabetes mellitus. This constancy should cover a period of many months in order to render the diagnosis positive and remove all doubt as to whether or not it is to be regarded as serious.

When an occasion arises in which doubt exists, a resort to the dietetic test can be made. This consists in giving the individual 3¼ ounces of pure glucose and examining the urine three or four hours later. If

large quantities are found it denotes a pathological condition, as the system can assimilate this amount in health, no trace showing in the urine.

It is manifest that all cases presenting glycosuria must be regarded as serious, and sufficient proof must exist that it is transient and not a true diabetes.

The differential diagnosis consists in the continuous presence of glucose in the urine, which is increased by the ingestion of saccharine and starchy foods, and associated with this must be signs of impairment of the general health—emaciation, muscular weakness, extreme thirst, high density, and increased quantity of the urine. This means true diabetes.

It is a fundamental rule that an individual cannot be accepted while glycosuria is present, and only when it is regarded as transient can it be favorably considered in the sub-standard class under the following conditions:

Diabetes is most frequent between 50 and 60 years of age, and it is about three times more frequent in males than females.

In all cases where glycosuria is found the individual must have a family history free from those conditions and diseases with which diabetes is likely to be associated, or which it is likely to follow. Heredity occupying such a prominent place as a causative factor (fully ⅓ of all cases can be traced directly to this alone) it is at once apparent that the family history should be free from this disease.

It is often associated with gout, tuberculosis and diseases of the nervous system.

Racial proclivities are strong, the Hebrew being especially prone to this disease, and the African practically exempt from it.

Syphilis.—The unwillingness of many applicants to confess to having had syphilis, and the acceptance of individuals with a previous history of syphilis by the insurance companies on the personal opinions of their medical director in the absence of any uniform rules, together with a hesitancy of the majority of physicians to ascribe syphilis as the direct or contributing cause of death, renders the reports somewhat unreliable and the statistical evidence far from accurate.

The fact remains, however, and is well recognized by every practicing physician, that the disease must be regarded as of potential influence in increasing the mortality rate, because of the decreased resistance of the constitution, particularly to diseases of the lungs and nervous system.

The conclusions reached by Dr. J. Nevin Hyde are incorporated in the chapter on syphilis and are the most lucid and concise extant (see Syphilis).

Tuberculosis.—Tuberculosis alone formerly caused about one-seventh of the deaths of all mankind.

This large percentage of deaths has been reduced in recent years. The United States census of 1890 showed a mortality of 245.4 per each 10,000 persons; in 1900 it was reduced to 190.5. This is a decrease of about 25 per cent.

This reduction can be attributed to our better knowledge of the disease with reference to its cause and prophylaxis. This lessened mortality rate has been conspicuous in the large cities, where formerly its

ravages were so great that it almost seemed as if its progress would continue indefinitely unimpeded.

This gratifying decrease in the large cities, which amounts to almost 50 per cent., has for its foundation the general acceptance and assimilation by the masses of the knowledge which has special reference to its prevention and cure.

This enlightenment and liberal education have been accomplished through wise local legislation and the infusion of modern ideas in the social and economic conditions and activities of life.

Notwithstanding this improvement in the mortality rate, individuals presenting themselves for insurance whose family history is clouded by a tuberculous taint, are sources of great interest to the medical department. It is in these cases that the personal factor of an applicant and the degree or attenuation of the taint are the only resources upon which can be based an opinion as to his expectancy. If the entire survey of the case is favorable and the estimation of all his chances seems to be sufficient to warrant the belief that he will have a good average after-life, then some form of policy should be issued consistent with the findings.

In an analysis of all the features entering into the consideration of these cases, the following are regarded as the most potent factors that will either enhance or mar his opportunity of living out his expectancy.

(1) Age
(2) Race
(3) Family history (Degree of taint)
(4) Physique and appearance

(5) Chest measurements
(6) Habits
(7) Occupation
(8) Environments
(9) Diseases predisposing to tuberculosis.

(1) AGE.—Age is a predisposing factor in the causation of tuberculosis, and the ages between 20 and 35 are regarded as those of predilection.

In the earlier years of life an hereditary tendency is especially prone to exhibit itself and predispose to the disease, whereas the acquired disease is more liable to show itself in the later years of life.

(2) RACE.—Race constitutes an important element, and while no race is entirely exempt, it is particularly prevalent among the Irish, the American Indians, and the Negroes. The latter, when there is a dilution of blood with other races, shows an increased tendency to this disease. The Hebrew race occupies the extreme in the class of immunes.

(3) FAMILY HISTORY.—Family history occupies first place, and exercises the most potent influence as a causative agent in the production and spread of tuberculosis.

The infectious nature of this disease makes this feature of family tendency all the more important, because two factors enter into its consideration, the transmitted predisposition and the early environment of the individual, both of which must be regarded as almost inevitable to an earlier or later contraction of the disease.

Statistical evidence abundantly bears out the fact of the powerful influence of an hereditary taint.

Dr. W. H. E. Wehner (Medical Examiner and Practitioner, April, 1906) offers the following quotation: "Some years ago a careful investigator closely searched the family histories in one hundred cases of patients having tuberculosis of the lungs and found that 70 per cent. of that number came of tainted stock. . . . It is said that an applicant's liability to tuberculosis varies in a tainted family in accordance with the number of healthy members as contrasted with those who were or are infected."

Dr. C. L. Green states as a cardinal fact "that applicants who have lost near relatives by tuberculosis furnish an excessive mortality and are unprofitable risks if taken at all ages and all conditions at ordinary rates." In support of this assertion he offers the conclusions of Dr. E. J. Marsh, which are based on a careful investigation and tabulation of 1994 cases.

"(1) That the history of consumption in any one of the immediate family increased the probability of its appearance in the applicant.

"(2) That consumption in a brother or sister is at least equal in importance to parental phthisis.

"(3) That 'Underweights' are much more liable to the disease than are 'Overweights.'

"(4) That robust and well developed individuals show comparatively little susceptibility to phthisis.

"(5) That the physique is of more importance than the family history, and that, consequently, a robust body may in some degree counterbalance a tainted family record."

This fact of the influence of heredity on those born of consumptive parents, or where an hereditary con-

sumptive taint exists, is strikingly illustrated by the following tables, originally presented by Dr. A. B. Bisbee (Some of the Conditions which Appear to Favor Tuberculous Infection).

They represent the combined experience of the Washington Life and National Life, and are quoted by Dr. L. C. Green:

FAMILY HISTORY

	Number of Cases	Deaths from Consumption	Percentage
Hereditary Consumptive Taint	688	158	23.65
No Hereditary Consumptive Taint	3,119	497	15.93
Total	3,787	655	17.30

(4) PHYSIQUE AND APPEARANCE. — A superb physical development, associated with a healthy appearance, as denoted by an erect figure, good muscular development and a clear skin, is not only indicative of

NUMBER OF CONSUMPTIVE DEATHS IN FAMILY

	Number of Cases	Deaths from Consumption	Percentage
One member of family	528	121	22.92
Two or more members of family	140	37	26.43
Total	668	158	23.65

health, but also of a superior resisting power to the invasion of tuberculosis. This must be considered a most favorable feature in individuals of tainted stock.

(5) CHEST MEASUREMENTS.—An expansion of two inches or less must be regarded as a bar to acceptance in all cases.

DEGREE OF CONSUMPTIVE TAINT

	Number of Cases	Deaths from Consumption	Percentage
Both parents	5	3	60.00
One parent and one or more brothers and sisters	62	19	30.65
Mother alone	157	46	29.30
Father alone	79	22	27.85
One brother or sister	292	53	18.15
Two or more brothers or sisters	73	15	20.55

A deficient expansion must be particularly emphasized in those who have a questionable family history, for a latent or quiescent tuberculosis may be present,

WEIGHT AS RELATED TO TUBERCULOSIS

Number of Cases 3,548	Predisposition Hereditary or Acquired	No Predisposition
	Percentage of Deaths from Consumption	Percentage of Deaths from Consumption
Weight above standard	5.59	5.20
Weight standard	25.91	15.67
Weight below standard	42.51	24.20

and in cases where a good expansion appears in an individual with a tainted history, it is well for the examiner to remember the results attained from the

practice of forced inspiration and expiration; this is not inconsistent with a tubercular process. In these cases a local deficiency is observed.

As before stated, in men of normal physique and proportion the chest measurement should not be less than one-half (½) of the height, and the difference between full inspiration and expiration should not be less than one-tenth ($^1/_{10}$) of the maximum chest measurement.

The following table presented by Dr. A. B. Bisbee represents the experience of the National Life, and very clearly shows the value of this point:

CHEST MEASUREMENTS

Number of Cases 1,454	No Predisposition			Predisposition Hereditary or Acquired		
	Number of Cases	Deaths from Consumption	Percentage	Number of Cases	Deaths from Consumption	Percentage
Girth of Chest less than one-half of the height..	264	68	25.76	104	47	45.19
Girth of Chest more than one-half of the height..	781	94	12.04	305	44	14.53

(6) HABITS.—It is at once apparent that good, regular habits in regard to eating, sleeping, recreation, and personal cleanliness are conducive to health, and, on the other hand, excesses along these lines will have a depreciating effect on the value of the life.

(7) OCCUPATION.—Occupation must be considered an important and vital element.

The sedentary occupations, where the position is cramped and ventilation poor, also those which require the continued inhalation of irritating vapors or dust, are prejudicial, while occupations which enable the applicant to receive the maximum amount of fresh air and sunshine will many times counterbalance an unfavorable family history.

(8) ENVIRONMENTS.—The surroundings and hygienic condition of the locality or apartments, together with the closeness of association with others who are infected, have a markedly unfavorable effect on those with a consumptive history.

(9) DISEASES PREDISPOSING TO TUBERCULOSIS.—Predisposition or the recognized body peculiarities existing in individuals whose procreators were tuberculous, which render them extremely susceptible to the development of the disease in subsequent years are shown by the following table by Dr. W. M. Hilton (Medical Examiner and Practitioner, Sept., '06):

PERCENTAGE OF DEATHS FROM CONSUMPTION

	Tainted	Untainted
Under 30	37.6	28.5
30 to 40	20.2	13.3
40 to 50	9.2	6.8
Over 50	4.9	4.6

As a matter of fact, all diseases, whether acute or chronic, have a tendency to lower the resisting powers, and when an hereditary predisposition exists this is the more marked, with the added danger of either

lighting up a latent infection or rendering the individual more vulnerable to the invasion of the tubercular germs.

The diseases especially prone to be followed by tuberculosis are bronchitis, when recurrent, bronchopneumonia, and influenza.

The other diseases which we may designate as general diseases are cirrhosis of the liver, diabetes, nephritis, sclerosis of the arteries, hereditary syphilis, and valvular diseases of the heart.

Sex.—Dr. A. S. Knight says: "Take the whole subject of insuring women. It is most interesting and instructive.

"The census returns of the United States showed that women reached a higher age than men, but in the case of insured women they did not.

"They ought to, because they are selected lives. If the women as a class reach a higher age than men, certainly the selected lives ought to reach a higher age than men, but they do not, or at least the insurance records do not show it, and they do not because of the element of moral hazard that is in the proposition. . . .

"The unfavorable experience with women as risks is due to more than the fact that they are not so thoroughly examined. They are apt, far in advance of men to anticipate, to have a premonition of failing health, of physical break-down, and without telling the truth to any one they try to get insured."

The importance of sex in its relation to life insurance consists in the moral hazard element and the ill effects of puberty, of parturition and the menopause, the essential stages through which every woman must

pass, and while these phases in life are regarded as physiological, yet the extra strain of passing through these essential processes will have an untoward effect in that it may awaken a slumbering tuberculosis or hasten its development, particularly in a woman whose family history is tainted.

Substandard Policies.—In the absence of a standard classification of substandard lives, the issuing of a policy on an impaired life is largely a matter of personal judgment on the part of the medical director after having all the facts connected with the case presented to him.

The choice of methods as now generally practiced by the different companies is limited to the following, because their successful operation has the sanction of the medical directors:

(1) The addition of an extra premium, or the addition to the present age of a number of years.
(2) The placing of a lien against the policy.
(3) The Endowment Policy.

The first or "rating up" plan is not as acceptable or profitable in the majority of instances as the others to be considered. This is especially so if the applicant is young, because the very reasons calling for the increased rate show a heavier mortality in the early years of life.

This plan is applicable to those cases in which the hazard is regarded as a decreasing hazard.

The second plan, or that of placing a lien against the policy, is an effective measure to overcome the difficulty. There are many ways in which this lien

may be terminated, but usually it is allowed to run level for five years, and thereafter returning to the insured annual dividends in equal instalments until the lien is effaced.

Another method similar to this and followed by one of the American companies, is presented by Percy C. H. Papps (Medical Examiner and Practitioner, Sept., 1904).

"A method now used by at least one of the big American companies is that of issuing policies to sub-standard lives at the regular with profit rates of premium, but the policies are placed in a special deferred dividend class.

"The profits which will be paid on these policies will depend upon the rates of mortality experienced by the policies in that class."

The Endowment policy furnishes a means of protecting the company from loss, provided it does not extend over a long period.

For instance, if an applicant presents himself with a family history which would lead us to believe that in twenty years or less he would become the victim of the disease, the reserve on the policy, if it were a Whole Life or a long Endowment, would not be sufficient to cover the risk; therefore, a short Endowment of ten or fifteen years would be granted. This would mature the policy before the age when the higher mortality would reasonably be expected; in other words, the liability of the company is limited and greater protection guaranteed because of the shorter time that must elapse when this policy can be enumerated as an asset.

PRACTICAL LIFE INSURANCE EXAMINATIONS

BIBLIOGRAPHY

In the preparation of this volume the following books and magazines have been consulted:

Medical Diagnosis	Musser
Diagnostics of Internal Medicine	Butler
Infancy and Childhood	Holt
System of Medicine	Pepper
The Signs of Internal Disease	Kintzing
Text Book Physiology	Brubaker
Practical Medicine	Thompson
Life Insurance Examinations	Symonds
Examinations for Life Insurance	Green
The Life Insurance Examiner	Stillman

The Journal of the American Medical Association

The Medical Examiner and Practitioner, etc., etc.

INDEX

Abdomen, 134
  enlargement of, general, 138
    local, 139
  examination of, 134
  inspection of, 136
  laxity of, 139
  markings of, 136
  movements of, 136
  organs of, 140
  palpation and percussion of, 137
  retraction of, 139
  tenderness of, 139
Abscess, 155
Acclimation, 24
Actuaries table,
  rule for determining expectancy by, 20
Addenda, 188
Adenoma, 32
African race, 24
Age, 19
  apparent, 19
  basis for premiums, 19
  family history and environment in relation to, 19
  importance of accuracy in, 19
  in hereditary diseases, 46
  premature, 19
  rapid aging, 20
  relation of, to tuberculosis, 210
Agent, 15
Albuminuria, 202
  acceptance of applicants in substandard class with, 204
  data for medical department, 202 et seq.
  qualitative tests for,
    Heller's, 149
    salt and acetic acid, 149
  quantitative estimation of,
    centrifugal method, 150
    Esbach's albuminometer, 150
Alcoholism, 155
  arrhythmia in, 133
  in relation to race, 24
  influence of heredity in, 46
  tremor in, 179
Alkapton in urine, 154
Allen, Dr. T. G., 180
Altar chest, 61
Amphoric breathing, 86
  resonance, 79
Amputations, 37
Amyloid disease, spleen in, 143
Anæmia, 159
  occupation as a cause of, 22
Aneurism, 156
  eyeball in, 31
  of abdominal aorta, 103
  pulse-wave in, 132
  vertigo in, 184
Ankle-clonus, 175
Aortic area, 96
  audibility of murmurs in, 118
  diffusion of murmurs in, 120
Aortic incompetency,
  blood-pressure in, 131
  pulse-wave in, 132
Aortic obstruction,
  diagnosis of, 121
  secondary effects of, 122
Aortic regurgitation,
  associated murmurs in, 123
  diagnosis of, 123
  secondary effects of, 124
Aortic stenosis,
  pulse-wave in, 132
Apex-beat, 97
  area of, 97
  displacement of, 98
  feeble or imperceptible, 98
  location of, 97
  normal changes of, 98
Apoplexy,
  in relation to race, 24
  influence of heredity in, 47
  relation of, to body configuration, 26
Appendicitis, 156
Appendix, region of, 144
Applicant,
  cachexia, 42
  configuration of the body, 26
  diathesis, 39
  ear, the, 31
  external examination of, 17, 26
  eyes, the, 29
  eye-ball, the, 30
  family history of, 42
  gait, 34
  habits of, 38
  hair, the, 27
  heredity of, 44
  identification of, 17
  medical history of, 51
  mouth, the, 31
  nails, the, 29
  neck, the, 32

Breath-sounds,
  diminished or absent, 89
  in disease, 85
  modifications of normal, 84
  normal, 83
Breathing,
  amphoric, 86
  broncho-vesicular, 86
  cavernous, 86
  in barrel-shaped chest, 61
  puerile, 88
Bricklayers, 23
Bright's disease,
  eruptions in, 165
  ulcer in, 28
Broadbent's sign, 101
Bronchial-breathing, 83
Bronchiectasis, 91
  chronic, 91
  occupation as a cause of, 23
  recurrent, 216
Bronchophony, 90
Broncho-pneumonia, 216
Broncho-vesicular breathing, 86
Bryant, Thomas, 48

Bubonocele, 42
  cancerous, 42
  malarial, 42
  syphilitic, 42
Bubonocele, renal, 43
  vesical, 23
Bunion,
  influence of heredity in, 48
  of stomach, 141
  cervical glands in, 33
  spleen in, 143
Burnouncle, 32
Carcinoma of rectum, 160
Cardiac cycle, events of, 96
Cardiac impulse, extent and character of, 99
Cavernous breathing, 86
Centrifugal method for quantitative estimation of sugar, 150
Cancere, of lips, 31
Chemists, analytic, 23
Chest,
  altar, 61
  barrel-shaped, 61
  counting the ribs of, 59
  examination of, in women, 59
  flat, 60
  funnel-breast, 61
  inspection of, 60
  local enlargement, contraction or depression of, 62
  measuration of, 67
    in relation to tuberculosis, 213, (table) 214
    relation of to physique, 214
  normal, 60
  palpation of, 69

INDEX

Chest,
physical examination of, 57
pigeon-breast and rachitic chest, 61
preparation for examination of, 59
topographical anatomy of, (regional), 57
unilateral contraction of, 62
unilateral enlargement of, 62
value of physical examination of, 57
Cheyne-Stokes breathing, 66
Chloral habit, 162
Choked disk, 30
Climacteric, 187
Climate,
change of, miminized, 24
contemplation of change of, 24
effects of, on disease, 23
Cocaine habit, 162
Coin percussion, 81
Colic and cramps, 158
Congestions of liver, ætiology of, 54
Connecticut Mutual Life Insurance Company, 198
Constipation, 22, 159
Consumption, in relation to race, 24
Corrigan pulse, 123, 124
Cough, 159
Cracked-pot sound, 79
Crepitant râles, 92
Cystitis, 54
frequent urination in, 183
reaction of urine in, 147

Davis, Dr. William B., 204
Dead, identification of, 18
Deafness, 37
Degeneracy, stigmata of, 35
Dementia, paretic, 55
Diaphragm phenomenon of Litten, 66
Diarrhœal affections, 23
Diarrhœa, chronic, 159
Diabetes,
associated with obesity, 171
eruptions in, 165
frequent urination in, 183
in relation to race, 24
influence of heredity in, 48
predisposition to tuberculosis in, 216
prostration in, 55
urine in, 146
insipidus, urine in, 145
mellitus, 206
dietetic test for, 206
urine in, 145
Diathesis,
acquired, 40
congenital, 39
gouty, 41
lithæmic, 40
lymphatic, 41
Diathesis,
nervous, 41
scrofulous or tuberculous, 41
Digestive disorders, bradycardia in, 133
Digestive disturbances, occupation as a cause of, 22
Digestive system, disturbances of, secondary to, 160
Digitalis, arrhythmia in administration of, 133
Dilatation, cardiac, reduplication of second sound in, 114
Diphtheria, ptosis as a result of, 30
Diseases and conditions affecting life insurance, 155
abscess, 155
alcoholism, 155
aneurism, 156
appendicitis, 156
asthma, 157
colic and cramps, 158
constipation, 159
cough, 159
diarrhœa, chronic, 159
digestive system, 160
drug habits, 162
dyspnœa, 163
ear, discharge from, 163
emaciation, 164
epilepsy, 164
eruptions, 165
fainting, 166
fistula, 166
glands, enlarged, 166. (See also Neck.)
gout, 166
hæmophilia, 167
hæmoptysis, 167
headache, 167
hemorrhoids, 169
hernia, 169
injuries and surgical operations, 169
jaundice, 170
muscular development, 171
obesity, 171
œdema, 172
paralysis agitans, 172
pensions, 173
physician, family, 173
prostate, 174
rectum, 174
reflexes, 174
rejection, previous, 175
residence, change of, 175
rheumatism, 176
sanitary surroundings, 176
sclerosis, arterio, 176
stricture, 177
syphilis, 177
temperature, 178
tobacco, 179
tremor, 179
tuberculosis, 180

INDEX

Diseases and conditions affecting life insurance,
  tumors, 183
  ulcers, 183
  urination, difficult or frequent, 183
  vaccination, 184
  varicose veins, 184
  vertigo, 184
  weight, 185
Donne's test for pus in urine, 153
Drug habits, 162
Dulness, 78
Dwarfs, 186
Dyspnoea, 163

Ear,
  color of external, in disease, 31
  discharge from, 31, 163
  tophi, 31
Eczema, 165
Egophony, 90
Elements of sounds, 73
Emaciation, 104
Embryocardia, 133
Emphysema, 89, 91, 113
  bradycardia in, 133
  chest in, 61
  occupation as a cause of, 22
  reduplication of second sound in, 114
Endocardial murmurs, 114. (See also Murmurs.)
Environment, 195
  in relation to age, 19
  in relation to tuberculosis, 215
Epidemic diseases, 23
Epigastric pulsation, 102
Epilepsy, 30, 41, 164
  intellection in, 188
  mistaken for vertigo, 184
Episternal notch, pulsations in, 102
Epithelioma,
  of lips, 31
  of tongue, 32
Eruptions, 165
Esbach's albuminometer, 150
Examination,
  of women, 186
  privacy during, 18
Examiner, the medical, 13, 193
  duties of, 14
  qualifications of, 13
Exocardial murmurs, 114. (See also Murmurs.)
Expectation of life,
  rule for determining, 20
  table of mortality, 21
Expiration, prolonged, 87
Eyes,
  alterations of vision, significance of, 29
  lids of, in administration of arsenic and iodine, 30
    in renal disease, 30
Eyes,
  papillitis, 30
  retinitis, 29
Eyeball,
  bilateral protrusion of, 30
  unilateral protrusion of, 31
Eyelids,
  in administration of arsenic and iodine, 30
  œdema of, 30
  warts on, 30

Facial expression, index of health
Fainting, 166
False murmurs, 126
  table of, from Kintsing, 126
Fehling's test for sugar, 151
Festinant gait, 35
Fistula, 166
Flat-chest, 60
Flatness, 79
Flint's murmur, 124
Forwarding reports, 15
Fremitus,
  friction, 106
  rhonchal, 70
  vocal, 69
French, Dr. J. M., 195, 196
Friction fremitus, 106
  pericardial, 125
  pleuro-pericardial, 126
  sound, pleural, 93
Friedreich's phenomenon, 80
Funnel-breast, 61

Gait, 34
  ataxic, 34
  festinant, 35
  spastic, 34
  steppage, 35
Gall-bladder,
  location of, 144
  tenderness of, 144
Gastric disturbances,
  secondary to, 53
  vertigo in, 184
Gerhardt's sign, 80
German race, 24
Giants, 186
Gilders, 22
Glands,
  cervical, secondary enlargement of, 33
  enlarged, 166. (See also Neck.)
  epitrochlear, 33
  post-cervical, 33
Glycosuria, 206
  acceptance of applicants in standard class, 207
  dietetic test for, 206
  family history in, 207
  persistent, 206
  racial proclivities in, 208
  temporary, 206

INDEX

Goitre, 23
  exophthalmic, 30, 132
Gonorrhœa,
  sequelæ of, 54
Gout, 166
  arrhythmia in, 133
  associated with glycosuria, 207
  blood-pressures in, 131
  influence of heredity in, 48
  obesity in, 171
Grand mal, 164
Green, Dr. C. L., 185, 194, 198, 211, 212

Habits, 38, 195
  in relation to tuberculosis, 214
Hæmatemesis, 167
Hæmophilia, 167
  atavism in, 48
  influence of heredity in, 48
Hæmoptysis, 167
Haines' test for sugar, 152
Hair,
  premature or localized whitening of, 27
Harbaugh, Dr. C. H., 181
Haser's coefficient, 147
Headache, 167
Health resorts,
  dangers of, 23
Heart,
  apex-beat, 97
  auscultation of, 108
    areas of, 96
    points to be determined by, 108
  cardiac cycle, events of, 96
  estimation of strength of, 111
  impulse of, extent and character of 99
  in gout, 53
  in rheumatic cutaneous lesions, 53
  inspection of, 97
  mobility of, 100
  neuroses of, 132
  organic lesions of, tachycardia in 132
  palpation of, 104
  percussion of, 106
    areas of, 95
    methods of, 106
  sounds
    adventitious, 114. (See also Murmurs.)
    individual, alterations of, 111
      aortic second, 112
      first, 111
      pulmonary second, 113
      reduplication of, 113
      second, 111
    normal,
      alterations of, 111
      diastolic, 109
      systolic, 109
      transmission of, 109
Heart,
  topographical anatomy of, 94
  valvular diseases of,
    predisposition to tuberculosis with, 216
Heat prostration, 56
Height and weight, table of, 187
Heller's test for albumin, 149
Hemic murmurs, 125
Hemiplegia, gait in, 35
Hemorrhoids, 169
  occupation as a cause of, 22
Heredity, 44
  alcoholism in relation to, 46
  apoplexy in relation to, 47
  atavistic transmission, 45
  cancer in relation to, 48
  diabetes in relation to, 48
  disparity of ages of parents, effects of, 45. (See also Age.)
  effects of marriage on, 45
  formation of a type or class, 45
  gout in relation to, 48
  hæmophilia in relation to, 48
  insanity in relation to, 49
  rheumatism in relation to, 49
  special inherited tendencies, 45
  syphilis in relation to, 50
  tuberculosis in relation to, 50
Hernia, 169
Hilton, Dr. W. M., 215
History, family, 42. (See also Heredity.)
  calculi, renal in, 43
  collateral branches of, 44
  difficulties in securing, 42
  indefinite terms as cause of death, 44
  in glycosuria, 207
  in relation to age, 19
    to chest measurements, (table), 214
  in substandard lives, 194
  in valvular lesions, 201
  predisposition in, 44
  relation of, to tuberculosis, 210
  rheumatism in, 43
  tuberculosis in, 43
History, medical, 51
  importance of, 51
  points of, 51
  points to be determined, 52
  significance of certain diseases, 52, et seq.
History, personal, 38
  in substandard lives, 195
  in valvular lesions, 201
Hyde, Dr. J. Nevin, 178, 208
Hydropneumothorax, 93
Hyper-resonance, 77

Identification, 17
  markings of skin for, 28
  of the dead, 18

INDEX

Indefinite terms as cause of death, 44
Influenza,
  predisposition to tuberculosis of, 216
Injuries and surgical operations, 169
Injuries of chest, 63
Insanity, 36, 41
  influence of heredity in, 49
  intellection in, 188
Inspection of abdomen, 136
  of chest, 60, 64
  of heart, 97
Inspectors, electric light, 23
Inspiration, jerking, 65, 87
Intellection, 188
Intercostal spaces,
  counting of, 59
Interrupted Wintrich's phenomenon, 80
Intestines, 144

Jaundice, 170
Jerking inspiration, 87
Jewish race, 24
  mortality in, 25

Kidney, cirrhosis of,
  blood-pressure in, 131
Knee-jerk, 174
Knight, Dr. August S. 197, 216

Landmarks of chest, 58
Laryngeal troubles,
  occupation as a cause of, 23
Lead poisoning, 22
  pallor in, 28
  tremor in, 180
Leucæmia, spleen in, 143
Lewis, Dr. Denslow, 38
Limping, 34
Lips,
  chancre of, 31
  epithelioma of, 31
  mucous patches of, 31
Lithæmia,
  arrhythmia in, 132
  blood-pressure in, 131
  vertigo in, 184
Litten's diaphragm phenomenon, 66
Liver,
  disease of,
    ætiological factors in, 53
    age of occurrence of, 54
  examination of, technic, 141
  palpation of, 142
  percussion of, 142
  pulsation of, 103
Locomotor ataxia,
  digestive system in, 161
  gait in, 34
  ptosis in, 30
  pupil, in 30
  reflexes in, 174
  station in, 34
Locomotor ataxia,
  tachycardia in, 132
  whitening of hair in, 27
Long-lived families, 46
Longevity,
  mind in relation to, 197
  occupation in relation to, 196
Lungs,
  auscultation of, 81
    adventitious sounds in, 91
    methods of, 82
    reasons for, 81
    technic of, 82
    value of, 81
  inspection of, 64
  percussion of, 70
    practical results of, 71
    technic of, 72
    sounds,
      in disease of lungs, 76
      normal, 74
      variation of normal, in health 75
Lupus, 165.

Malaria, 23
  chronic, spleen in, 143
Marital relations as affecting risk, 197
Markings of skin,
  caused by previous disease, 28
  for identification of dead, 18
Marriage, effects of, on risk, 25
Married or single, 25
Marsh, Dr. E. J., 211
Medical examiner, the. (See Examiner, the Medical.)
Medical officers, judges of risks, 23
Melancholia, 189
Meniere's disease, vertigo in, 184
Menopause, 216
Menstruation, disorders of, 187
Mensuration of chest, 67
  deficient expansion, 68
  extreme expansion, 68
  in relation to physique, 214
  in relation to tuberculosis, 213, (table), 214
  in women, 187
  normal expansion, 67
  technic of, 67
Mental health, 188
Metallic tinkling, 93
Meteorological changes, effects of, on disease, 23
Mind, in relation to longevity, 197
Mitral area, 96
  audibility of murmurs in, 118
  diffusion of murmurs in, 120
Mitral obstruction,
  blood-pressure in, 131
  diagnosis of, 123
  hæmoptysis in, 167
  pulmonary second sound in, 113
  pulse-wave in, 132

INDEX

Mitral obstruction,
reduplication of second sound in, 114
secondary effects of, 123
Mitral regurgitation,
diagnosis of, 121
pulmonary second sound in, 113
secondary effects of, 121
Miscarriages, 187
Moist rales, large, 93
Moral hazard, 38, 195, 197, 216
Mortality,
as affected by tuberculosis, (tables), 212–213
expectation, table of, 21
in Jewish race, 25
Mouth, lips in anæmia and enfeebled circulation, 31
Mucous patches, 31
Mucous rales, 93
Murmurs,
assignment of, with reference to heart sounds, 119
audibility of, 117
in aortic area, 118
in mitral area, 118
in pulmonary area, 118
in tricuspid area, 118
backward, 115
classes of, 115
determination of, 116
diastolic,
aortic regurgitation, 123
mitral obstruction, 123
pulmonary regurgitation, 124
tricuspid obstruction, 124
diffusion and transmission of, 120
endocardial, 114
exocardial, 114
pericardial friction, 125
pleuro-pericardial friction, 126
false, 126
frequency of, arranged according to time of, 125
Green's deductions, 116
hemic, 115, 125
individual, 120
diastolic, 123
systolic, 121
interpretation of, 117
most essential element in diagnosis of, 125
of obstruction, 119
of regurgitation, 119
onward, 115
organic, 115, 116
relative frequency of valve lesions, 124
systolic,
aortic obstruction, 121
mitral regurgitation, 121
pulmonary obstruction, 122
tricuspid regurgitation, 122
Murmurs,
time of, 118
Muscular development, 171

Nails, 29
disturbed nutrition of, 29
transverse groves, significance of, 29
National Life, 212
Neck, 32
glands of, enlargement of, 32
rigidity, causes of, 32
tracheal tugging, 33
tumors of, 32
Nephritis, chronic interstitial,
heart in, 112
predisposition to tuberculosis in, 216
reduplication of heart sounds in, 114
retinal changes in, 29
urine in, 145, 146
Nervous system, 188
Neurasthenia, 161
muscular weakness in, 55
tachycardia in, 132
urine in, 146
Neuritis, localized whitening of hair in, 27
multiple, gait in, 35
Neuroses,
occupation as a cause of, 22
of heart, 132
Nevin, Dr. John, 41
New York State Insurance Department,
table of mortality, 21
Nipple, a landmark, 59
Nose,
deformities of, 31
in myxœdema, 31
polypi of, 31
syphilitic lesions of, 31
ulcers of, 31

Obesity, 171
blood-pressure in, 131
occupation as a cause of, 22
relation of, to body configuration, 26
Occupation, 20, 195
active, in relation to disease, 22
increase in hazard in, 20
in relation to longevity, 196
in relation to tuberculosis, 214
in valvular lesions, 201
influence of, on longevity, 22
moral hazard in, 20
previous, 22
relation of, to sex, 25
sedentary, in relation to disease, 22
special class, 22
statistical table of, 196

INDEX

Œdema, 172
Ogden, Dr. J. Bergen, 148
Old age, as cause of death, 44
Opium habit, 162
Orbit, tumors of, 31
Otitis, 164

Paget, Sir J., 48
Painters, 22
Palpation,
  of abdomen, 137
  of chest, 69
  of heart, 104
Palpitation, 132
Papillitis, 30
Pappe, Percy C. H., 218
Paralysis agitans, 172
  gait in, 35
Paralysis of third nerve, 30
Parents, neurotic, effects of, on apparent age, 19
Paretic, general, 189
Paroxysmal tachycardia, 132
Parturition, 216
Pectoriloquy, 90
Pelvic organs, 186
Pensions, 173
Percussion,
  areas, of heart, 95
  of heart, 106
  of lungs, 70
Pericardial friction, 125
Petit mal, 164
Phenylhydrazin test for sugar, 152
Phillips, Dr. Wendall C., 163
Phthisis,
  early sign of, 88
  occupation as a cause of, 23
Physical defects and deformities, 36
Physician, family, 173
Physique, 26 et seq.
  in relation to tuberculosis, 211, 212
Pigeon-breast, 61
Placenta, tuberculosis of, 51
Planing mill employee, 23
Pleural adhesions, 63
  effusion, 62
Pleurisy,
  in medical history, 53
  pulsating, chest in, 62
Pleuro-pericardial friction, 126
Pneumonia, occupation as a cause of, 22
Policies, substandard,
  endowment, 218
  extra premium ("rating up" plan), 217
  lien, 217
Polypi, nasal, 31
Præcordia, pulsations of, 101
Predisposition,
  in flat-chest, 61
  in relation to family history, 44
Predisposition,
  relation of, to body configuration, 26
  to tuberculosis, 215
Premature aging, 19
Professional strong men, 186
Prolonged expiration, 87
Prostate, 174
  enlargement of, frequent urination in, 184
Psoriasis, 165
Ptosis, 30
Puberty, 216
Puerile breathing, 88
Pulmonary area, 96
  audibility of murmurs in, 118
  diffusion of murmurs in, 120
Pulmonary obstruction,
  diagnosis of, 122
  secondary effects of, 122
Pulmonary regurgitation,
  diagnosis of, 124
Pulsations,
  epigastric, 102
  hepatic, 137
  in episternal notch, 102
  in smaller arteries, 104
  in veins, 104
  new, in præcordial region, 101
  not restricted to præcordia, 101
  of arteries in neck, 102
  of liver, 103
  transmitted, 103
Pulse, 128
  physiological and pathological conditions of, (terms used by Brubaker), 129
  points to be determined, 128
  rate, 128
  rhythm, 130
  size and condition of vessels, 129
  technic of taking, 128
  tension of, (suggested by Musser), 130
  time of taking, 128
  wave, 131
Pupil, Argyll-Robertson, 30
Pus in urine, 153
Pyelitis, 54
Pyopneumothorax, 93

Quality of sounds, 73

Race, 24
  African, 24
  German, 24
  immunity from or susceptibility to particular diseases, 24
  in relation to tuberculosis, 210
  Jewish, 24
  Scandinavian, 24
Rachitic chest, 61
Rales, 91
  crackling, 182

INDEX

Rales,
dry, varieties of, 91
moist, varieties of, 92
Recommendation, examiner's, 189
Rectum, 174
Reduplication of heart sounds, 113
Reflexes, 174
Rejection, previous, 175
Reports, forwarding of, 15
Residence, change of, 175
Resonance,
amphoric, 79
pulmonary, 74. (See also Percussion of Lungs.)
departures from, 76
diminished or impaired, 78
Skodaic, 77
vocal, 89
Respiration,
rate, 65
rhythm, 65
abnormal, 65
change of, 87
types of, 64
vigorous, alteration of intensity in, 88
Respiratory sounds, 83
Rheumatism, 43, 176
in medical history, 53
influence of heredity in, 49
occupation as a cause of, 22
occurrence of endocarditis in, 53
Rhonchal fremitus, 70
Ribs, counting of, 59
Robert's test for quantitative estimation of sugar, 153

Salt and acetic acid test for albumin, 149
Sanitary surroundings, 176
Sansom's plexímeter, method of use, 106
Scandinavian race, 24
Scapula, a landmark, 59
Sclerosis, lateral, gait in, 35
Sex, 25
in ætiology of disease, 25
women as risks, 216
Sexual excesses, tachycardia in, 132
Short-lived families, 46
Sibilant rales, 91
Sibley, Mr., 48
Skin, 27
appearance of, in disease, 28
bronzing of, 28
cicatrices or scars, 28
color of, as index of health, 28
linear striæ, 29
pallor of, 28
Skodaic resonance, 77
Sonorous rales, 91
Sounds, analysis of, 73
Spastic gait, 34
Spine, curvature of, 36
Spleen,
enlargement of, 143
location of, 143
percussion of, 143
Station,
in disease, 33
in health, 33
Status lymphaticus, 41
Steppage gait, 35
Stertorous breathing, 66
Stomach, 140
cancer of, 141
inspection and palpation of, 140
neuroses of, 161
percussion of, 141
tenderness of, 141
topographical anatomy of, 140
ulcer of, 141
vertical diameter of, significance of, 141
Stricture, 177
Sub-crepitant rales, 92
Substandard insurance, 191
impairments, systematism of, 192
Substandard lives,
by reason of,
albuminuria, 202
asthma, 205
family history, 194. (See also Heredity.)
glycosuria, 206
heart lesions, 199 et seq.
occupation, moral hazard and environment, 195
personal history, 195
sex, 216
syphilis, 208
tuberculosis, 208
under and over weight, 198
classification of, general, 194
definition of, 191
first grade of, with heart lesion, 200
limitations, sources of, 193
occupations, (table), 196
policies issued on, 217
under and over weight, (table), 198
Succussion sound, 93
Suicide, in relation to race, 24
Sugar in urine, tests for,
Fehling's, 151
Haines', 152
phenylhydrazin, 152
quantitative estimation of Robert's, 153
Swaying, 34
Symonds, Dr. Brandreth, 202
Symptoms, subjecture, 54
anæsthesia in, 56
conclusions from a study of, 56
diagnostic importance of, 55
hyperæsthesia in, 56
of heat prostration, 56

INDEX

[illegible]
  [illegible] special senses, 55
  [illegible] of, 54
[illegible], 177, 208
  cervical glands in, 33
  headache in, 168
  in relation to race, 24
  influence of heredity in, 50
  predisposition to tuberculosis in, 216
  spleen in, 143

Tachycardia, 132
  paroxysmal, 132
Temperament,
  nervous, 188
  phlegmatic, 188
  sanguine, 188
Temperature, 178
Thomson's disease, 171
Thrills, 105
  in aneurism, 105
  in aortic incompetency, 105
  in aortic stenosis, 105
  in mitral incompetency, 105
  in mitral stenosis, 105
Thyroid gland, 32
Tobacco, 179
  excessive indulgence in, 132
Tongue, 32
  epithelioma of, 32
  scars, 32
  syphilis of, 32
  tuberculosis of, 32
  ulcers of, 32
Tophi, 31
Traube's space, 76
Tremor, 173
  fibrillary, 180
  intentional, 179, 189
  temporary, 179
Tricuspid area, 96
  audibility of murmurs in, 118
  diffusion of murmurs in, 120
Tricuspid obstruction,
  diagnosis of, 124
Tricuspid regurgitation,
  diagnosis of, 122
  pulsation of liver in, 103
  secondary effects of, 122
  venous pulsation in, 104
Tricuspid valve,
  evidence of competency of, 113
Tubercular disease,
  effect of, on apparent age, 19
  occupation as a cause of, 23
  relation of, to body configuration, 26
Tuberculosis, 43, 89
  age in relation to, 210
  associated with glycosuria, 207
  cervical glands in, 33
  chest measurements in, (table), 214
  crackling rales in, 182
Tuberculosis,
  diseases predisposing to, 215
  environment in, 180
  family history, relation of to, 210
  family history in relation to mortality, (table), 212
  in relation to environment, 215
    habits, 214
    occupation, 214
    race, 210
    weight, 211
  influence of heredity in, 50
  mortality of, 208
  physique in relation to, 211, 212
  predisposition to, 180
  pulse in, 181
  pupil in, 181
  ratio of breath sounds in, 182
  reduplication of second sound in, 114
  tachycardia in, 132
  temperature in, 179, 181
  variation of liability to, (tables), 212–213
Tumors, 183
Tympany, 74, 78. (See also Percussion of Lungs.)

Ulcers, 183
  of nose, 31
  of stomach, 141
  of tongue, 32
Urination, difficult or frequent, 183
Urine,
  albumin in,
    qualitative tests for,
      Heller's, 149
      salt and acetic acid, 149
    quantitative estimation of,
      centrifugal method, 150
      Esbach albuminometer, 150
    technic (suggested by Dr. Ogden), 148
  alkapton in, 154
  approximation of solids, 147
  color of, 146
  density of, 146
  examination of, 145
    chemical, 147
  pus in, Donne's test for, 153
  quantity of, 145
  reaction of, 146
  sugar in, tests for,
    Fehling's, 151
    Haines', 152
    phenylhydrazin, 152
    quantitative estimation of, Roberts' test, 153
  turbidity of, 147

Vaccination, 184
Valves,
  frequency of affection of, 124

INDEX

Valves,
relative frequency of defects of, 199
Valvular lesions,
age of, 201
arrhythmia in, 132
classification of, with reference to severity, 200
combined, (table), 199
compensation of, 200
family history in, 201
from puberty to middle life, 201
habits in, 201
in females, 201
in males, 201
occupation in, 201
personal history in, 201
predisposition to tuberculosis in, 216
Varicose veins, 184
occupation as a cause of, 22
Veins,
fluid, 115
general enlargement of, 104
inspection of, 104
localized engorgement of, 104
Venous pulse, 104
Vertigo, 184
Vesicular breathing, 84
diminished or absent, 89
Vocal fremitus, 69
diminished, 70
increased, 70
resonance, 89
diminished, 90
in tuberculosis, 182
increased, 90
Voice, auscultation of, 89

Warts, on eyelids, 30
Washington Life, 212
Water-hammer pulse, 123
Wehner, Dr. W. H. B., 211
Weight, 185
relation of, to tuberculosis, 211, (table), 213
under and over, 185, 186, 198, (table), 198
Weil's disease, jaundice in, 170
Wintrich's phenomenon, 80
Women,
examination of, 59, 186
insurance of, 216

Xiphoid cartilage, 95

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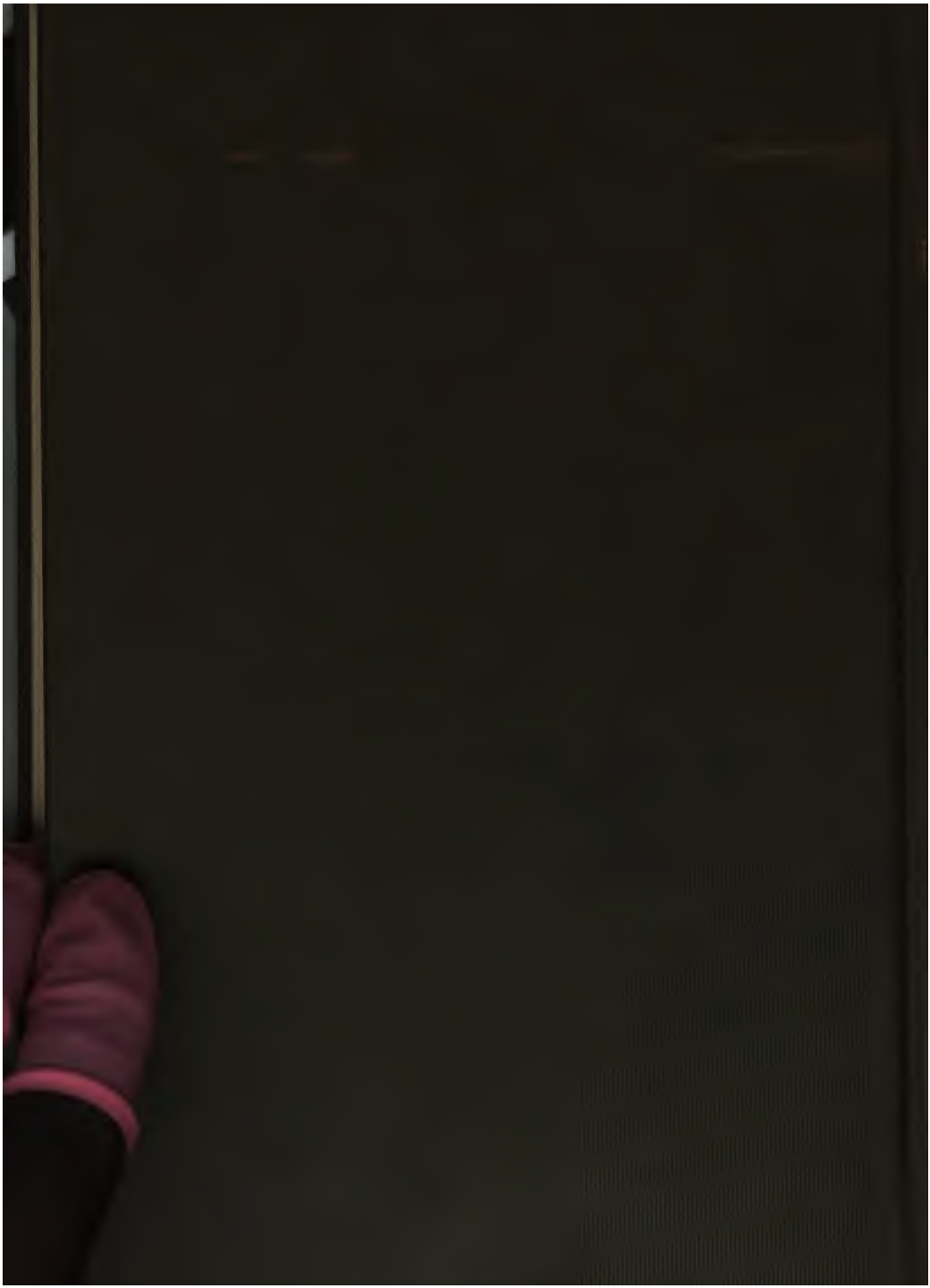
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